

SUGARLOAF MOUNTAIN FOREST

FOREST STEWARDSHIP PLAN

FEBRUARY 2005



King County

Department of Natural Resources and Parks
Water and Land Resources Division

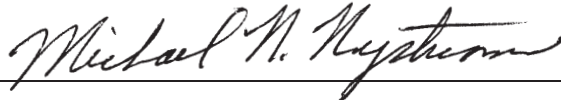
SUGARLOAF MOUNTAIN FOREST

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February 2005



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EXECUTIVE SUMMARY

Sugarloaf Mountain Forest is a 285-acre forest off of the SE Kent-Kangley Road between 320th Avenue SE and 337th Avenue SE in the Ravensdale/Kangley Area. The forest was acquired through the King County Transfer of Development Rights Program in 2001.

The purpose of this plan is to guide King County Department of Natural Resources and Parks (DNRP) managers and staff in the ongoing management of Sugarloaf Mountain Forest.

This Forest Stewardship Plan (FSP):

- (1) Establishes baseline information regarding; (A) ecological values and (B) forest resources and (C) public uses.
- (2) Establishes guidelines to protect and restore sensitive areas.
- (3) Prescribes active forest management activities.

The goal of all King County-owned Working Forest Properties, as stated in the “Programmatic Plan for Management of King County-owned Working Forest Properties” is as follows:

“to sustain and enhance environmental benefits, demonstrate progressive forest management and research, and, where appropriate, provide revenue for the maintenance, management, and further conservation of forestland. Develop guidelines for the management of all County-owned working forests, balancing timber production, conservation and restoration of resources, and public use”.

The site management goals in order of priority are:

1. Protect, enhance and restore ecological systems
2. Develop and sustain healthy, multi-species, multi-age stands
3. Produce periodic forestry revenue to offset stewardship costs of the property
4. Improve and/or maintain forest roads that are necessary; abandon others
5. Provide appropriate passive recreation and educational opportunities

The prioritization of the goals is based on the past use of the property for mining and timber extraction, soils condition, current economic outlook, relatively low recreational demand, and lack of threatened critical areas. The soils have been affected by past land use; the growth of alder is being encouraged to slowly improve the soils naturally. In the short term, with the exception of a pre-commercial alder thinning, resource management activities will be passive in nature due to the lack of revenue generating possibilities.

The only significant aquatic resources on the property are seven intermittent streams and seeps which drain the southeast and southern slopes of the property. These headwater streams and seeps are critical to the functioning of a large wetland complex south and east of the property. One intermittent stream flows northeasterly into the Cedar River Basin. There are no significant wetlands on the property. Wildlife, especially deer and elk, are abundant on southern exposures. The prescribed forest management practices will gradually restore healthy forest soils.

The King County Forestry and Natural Resource Lands Management Programs will work with other King County staff, Washington State Department of Natural Resources (WA DNR) staff, and/or private professionals to implement best available science in protecting the ecological resources of the property. Best management practices for maintaining all ecologic, economic, and social resources will be used when implementing this plan. Limiting disturbance and maintaining adequately dense understory and overstory will help maintain soil resources and discourage invasive plants. Retaining snags throughout the forest and incorporating the retention of structural components in forest practices will benefit a variety of wildlife species. Estab-

lishing formal and informal management agreements with adjacent landowners will help protect and enhance habitat connectivity. A cost/benefit analysis will be completed before implementing any natural resource management activity.

Sugarloaf Mountain Forest was most recently harvested in 1993-1994. The forest currently consists of four stands differentiated by age, species, stocking, size, topographic features, and access considerations. Young red alder and bigleaf maple stands predominate with small patches of 45 year old western hemlock and associated red alder scattered across the property.

Portions of Stand 1 (**Figure 3**) may be pre-commercially thinned in the next four to seven years. This same stand may be harvested in approximately twenty years and replanted with a mixture of western red cedar, western hemlock, and Douglas fir. Stand 2 and Stand 3 will be monitored over the 10 year timeframe of this plan and beyond for forest health and invasive species. Stand 4, a coal mine hazard area, will be managed for public safety and forest health and will not require any treatment within the next 10 years.

Access to Sugarloaf Mountain Forest is via a gravel road off of SE Kent-Kangley Road. There is a locked gate at this road entrance. This road is a recorded private right of way which does not allow public access.

A Road Maintenance Plan will be developed to determine what restorative practices and maintenance is needed to protect natural resources of the site. Grading and maintaining the existing main road was done in 2004. Future costs are unknown.

The Office of Natural Resource Lands will monitor the effectiveness of the management recommendations in meeting the goals and objectives of this plan. This forest stewardship plan will be updated every ten years, or as conditions and policies regarding Sugarloaf Mountain Forest change.

In 50 years, the Sugarloaf Mountain Forest site will be on the way to becoming a diverse forest with ample wildlife habitat. Larger Douglas-fir will be found in some alder dominated areas. Red alder will have been harvested from areas within Stand 1 and replanted with a mixture of conifers. The hydrologic functions will have been protected through the continuation of forestry as the primary land use on the property. Invasive weeds will have significantly decreased throughout the property due to the closure of the canopy and lower availability of sunlight. Wildlife populations will be stable due to connectivity provided by positive relationships with neighboring landowners. A regional trail will link the Green River Regional Trail to the Cedar River Regional Trail through Sugarloaf Mountain Forest. A forestry interpretive trail will inform the public of sustainable forest management practices on the site. An active "Friends of Sugarloaf Mountain Forest" will assist land managers with volunteer events to continue the stewardship of the natural resources of the site.

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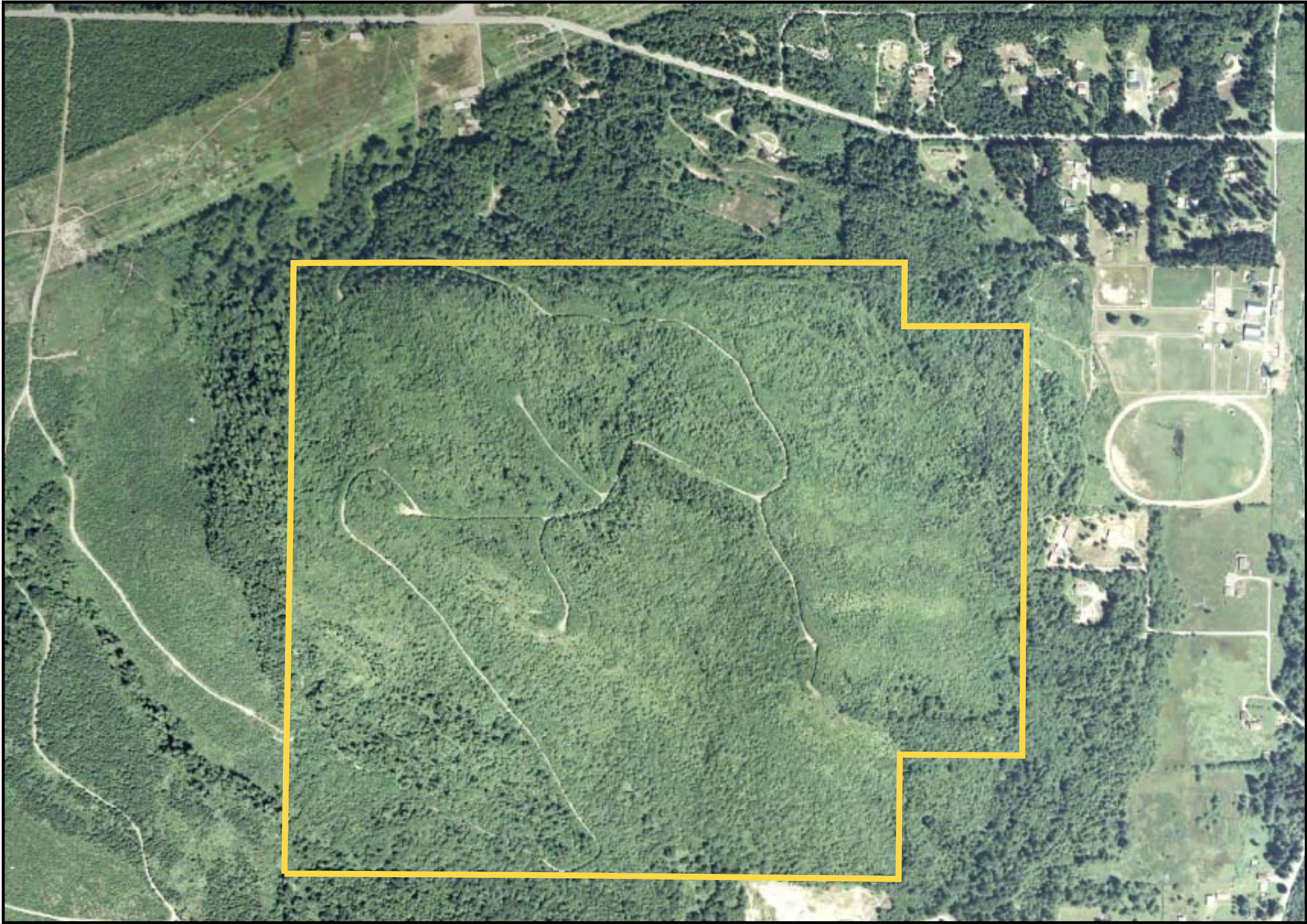
INTRODUCTION

Site History

From the 1920s to the 1940s, the southwestern portion of the Sugarloaf Mountain Forest was developed for a coal mine, and second growth timber was harvested from this area. After the mine closed in the 1940s, the property was divided and sold into several parcels bought by different landowners who used the property for a variety of interests, including timber harvesting (WA DNR, 1985). In 1992, James and Terry Cook purchased the parcels. The Cooks harvested timber from the property in 1993-94. In 2001, the Cooks sold the development rights to the King County TDR Bank and donated the underlying land to King County. Sugarloaf Mountain Forest was under the custody of the Parks Department until the reorganization of King County Department of Natural Resources and Parks (DNRP) in 2002. As part of the reorganization process, Sugarloaf Mountain Forest and three other forested sites were classified as “working forest resource lands” and transferred to the Water and Land Resources Division within DNRP.

TABLE 1: Property Information

Location	SE Kent-Kangley Road between 320 th Ave SE and 337 th Ave SE
Parcels	3422079011, 3422079090, 3422079081, 3422079003, 3422079009, 3422079088, 3422079087, 3422079086, 3422079085, 3422079084, 3422079083, 3422079082, 3422079089
Acreage	285 acres
WRIA	9 - Green/Duwamish (east side of Sugarloaf Mountain Forest) and WRIA 8 - Cedar/Sammamish (west side of Sugarloaf Mountain Forest)
Drainage Basin	Middle Green River, Cedar River
Council District	9
Parks Maintenance District	Lake Wilderness District
Urban/Rural	Rural
Zoning	RA-5
Climate	Average annual precipitation is 35 to 45 inches. The frost-free season is 160-200 days. Marine climate with dry, warm summers and cool, moist winters with intermittent snow cover.
Topography	A small mountain that lies within a flat area in the foothills of the Cascade Mountain Range
Elevation	Ranges from 950 ft. to 1420 ft.
Aspect	Variable
Legal Description	Those portions of Section 34 Township 22N Range 7E, West Meridian, King Co. Washington, described as follows: W ¹ / ₂ , SW ¹ / ₄ , NE ¹ / ₄ , S ¹ / ₂ , NW ¹ / ₄ , N ¹ / ₂ , SW ¹ / ₄ , NW ¹ / ₄ , SE ¹ / ₄ , together with Parcel 8 of King County Lotline Adjustment No. 590M0124, N ¹ / ₂ , S ¹ / ₂ , SW ¹ / ₄ , and NW ¹ / ₄ , SW ¹ / ₄ , SE ¹ / ₄ , also together with easement for ingress and egress as described as Tract A under AFN 8701220593 and easement for ingress and egress described under AFN9108010547.



SUGARLOAF MOUNTAIN FOREST

Figure I
2002 Orthophotograph



Sugarloaf Mountain Boundary



0 200 400 600 800 Feet

November 2003



King County
Department of
Natural Resources and Parks
Water and Land Resources Division

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Ortho: Emerge 2002 Image
File Name: 0312Sugarloaf_01Figure.eps sk

Prepared by: DNRP GIS Unit and WLR Visual
Communications and Web Unit

Acquisition/Funding Source Information

In 2001, King County purchased the development rights from the private landowner using funds from the King County Transfer of Development Rights (TDR) bank. The land was appraised at the time at \$2.6 million and the County purchased the 56 development credits for \$1.4 million. The underlying fee ownership was donated by the sellers. With their donation, the selling land owners established the following deed restrictions on the property:

- Promote forest land uses including timber production
- Preserve environmentally important areas
- Provide opportunities for environmental education
- Protect wildlife areas
- Provide a natural trail linkage

(Statutory Warranty Deed, Recording #20010102000330)

The deed also stipulates that “structures and improvements may be constructed, located, developed, used and maintained to enable or enhance educational and passive recreational uses by the public.”

Access/Easements

King County has an easement from a neighboring landowner for road access from the north entrance of the property off of SE Kent-Kangley Road (King County recording #2001220000218). This private right of way easement runs with the neighboring land, regardless of landowner. There is no public access via this or other rights of ways.

Neighboring Landowners

Sugarloaf Mountain Forest is surrounded completely by private landowners and timber companies. Plum Creek Timber Company borders the west side of Sugarloaf Mountain Forest and Mutual Materials Company borders the south. Small landowners border the north and east side of Sugarloaf Mountain Forest. Establishing good working relationships with these various landowners is important to the long-term management of Sugarloaf Mountain Forest. King County will stay apprised of surrounding management activities and will inform these adjacent landowners before initiating forest practice or site development activities (King County, 2003).

Sugarloaf Mountain Forest is an integral piece of the “Rock Creek Vision,” a citizen effort to conserve open space and forestland in the Maple Valley/Ravensdale area. This vision was developed by the Friends of Rock Creek, a group of area residents concerned about threats from development to the natural resources of Rock Creek Valley. The “Rock Creek Vision” has been approved by the King County Council (King County, 2000, Motion 11152). The goals of the Vision include protecting fish and wildlife habitat and maintaining forest cover for water and wildlife protection, aesthetics, recreation and commercial forestry opportunities.

Annual Site Maintenance Plan

The 2003 Site Maintenance Plan for Sugarloaf Mountain Forest included mapping/GIS of road system, litter/garbage and invasive non-native plant removal, site meetings, drainage maintenance and repair, signage, natural area restoration, project planning, and park inspection. The projected annual Maintenance and Operating budget for 2003 was \$8,604 with a projected annual cost of support work in 2003 estimated to be \$4,020. As of December, 2003 these are estimated costs, not actual dollars spent. They are meant only to be used as a rough guideline for future annual maintenance costs.

FOREST RESOURCES

Forest Health

Certain practices associated with the most recent harvest (1993-94) have diminished the overall forest health of the property. Many of the planted Douglas-fir were never properly released from competing red alder and shrub species. Assuming the harvest areas were replanted to Washington Forest Practices standards (200 trees per acre successfully regenerated 3 years following harvest), many stems have been lost to mountain beaver damage. The limited survival of the planted Douglas-fir has resulted in current stands with a high percentage of red alder. These deciduous stands lack a diversity of species and stand structure. Based on these vegetation conditions, it appears that the slash burning associated with the harvest has decreased soil fertility.

The forest stewardship plan prepared by the previous landowner made note of some root rot in the Douglas-fir. This was one of the contributing factors in the decision to manage for red alder, which is resistant to the two primary root rot pathogens in western Washington (*Armillaria ostoyae* and *Phellinus weirii*).

Alder-dominated areas in the northeast area of the property have a healthy western hemlock understory.

Specific Forest Health Concerns

FIRE:

Level: Low.

Cause: The area was slash burned following harvest consuming much of the fuel load, and alder represents a poor fuel source.

Action: Education and user awareness

SOIL QUALITY:

Level: Medium.

Cause: The soils on the upper slopes with southern aspect are diminished in quality due to the cumulative impacts of high permeability, southern exposure, past slash burning, and lack of an organic layer.

Action: Promote growth of alder for its nitrogen fixing quality. Future harvesting will utilize low compaction methods.

INSECTS:

Level: Low, nothing to be concerned with.

ROOT DISEASE:

Level: Low.

Cause: Some root rot was present in the previous stand.

Action: Manage for alder in the short term. This will reduce the host species available for the root rot pathogens. The residual coniferous stands should be periodically monitored for indications of root rot. If the pathogen gets epidemic, determine the exact fungal species, and control through the introduction of resistant tree species.

NOXIOUS AND INVASIVE PLANT SPECIES:

Level: Washington State class A, B, and C weeds are all low. Weeds of concern include medium levels of Himalayan blackberry, English holly, Tansy ragwort and butterfly bush.

Cause: Variety of transport vectors.

Action: Tansy ragwort control is required. Butterfly bush has colonized the roadside areas and to a lesser extent the forest land. Parks maintenance staff will attempt to remove these weeds when grading the road. The level of Himalayan blackberry present does not require control. They should diminish as the canopy gaps fill in. Monitor the levels of invasive weeds. If deemed necessary, control invasive problems through the use of Parks maintenance staff or volunteers.

MOUNTAIN BEAVER DAMAGE:

Level: High.

Cause: Sword fern and other herbaceous species provide optimal food source for Mountain Beaver.

Action: Manage for alder in areas of high mountain beaver browse. It appears that the population is on the decline, but future conifer reforestation plans should evaluate the population levels and consider planting 18-24 inch trees and protect them with plastic mesh seedling protectors.

BIODIVERSITY:

Level: Limited.

Cause: Past harvesting activity created stands with a high percentage of deciduous species and lack of structure.

Action: Retain the residual unharvested coniferous stands for the short term. They will provide standing and down dead trees over time which are lacking across the forested landscape on this and surrounding properties. Manage for a variety of species and ages of live and dead trees.

WIND THROW:

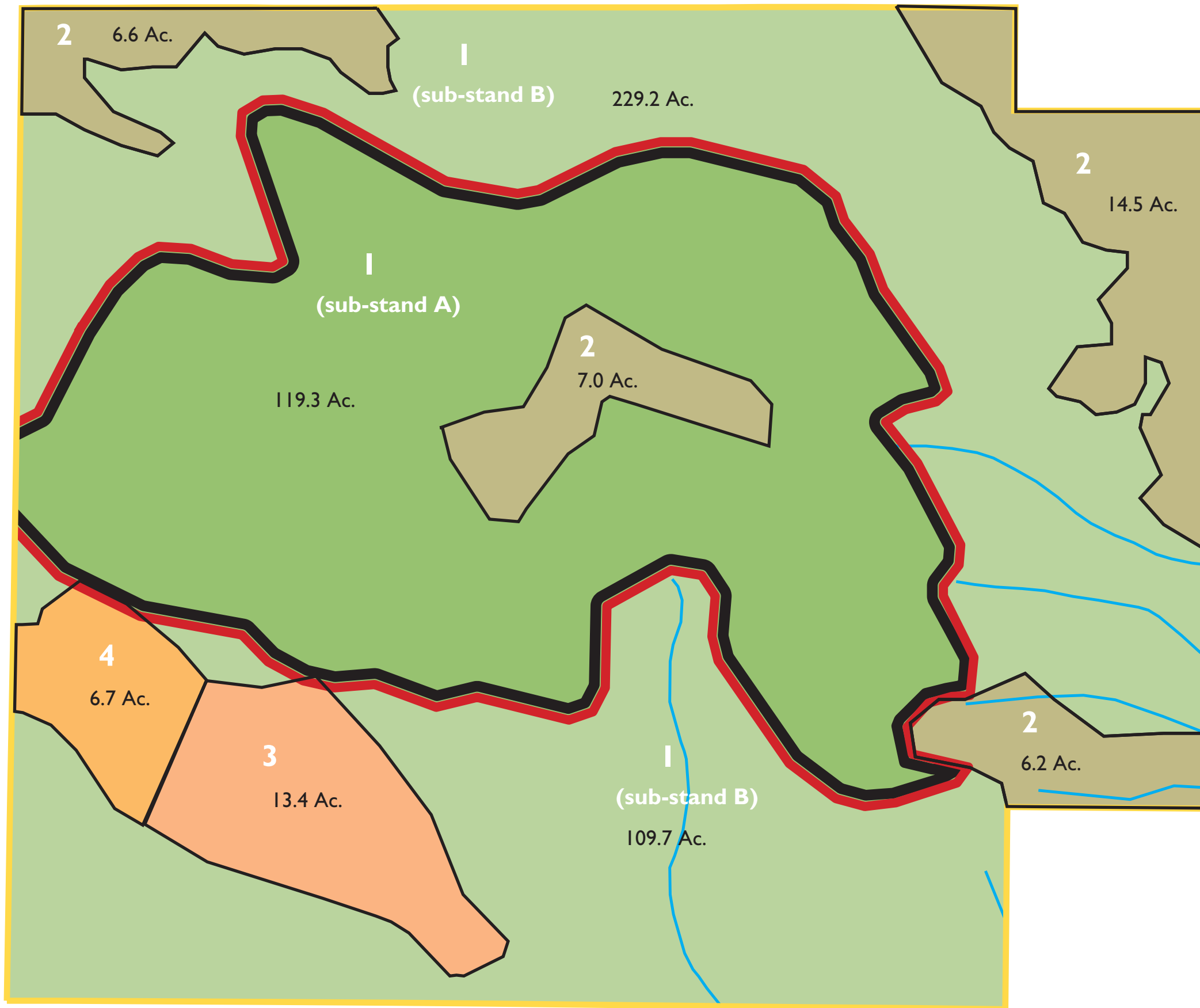
Level: Medium.






Cause: The interface between harvested and unharvested stands has had some wind throw.

Action: Do nothing. The affected area is a minor percentage of the site. Blowdown will decrease as young deciduous and coniferous trees take hold and residual trees develop a deeper root system. Blowdown will be beneficial to wildlife since there is a lack of down and dead woody debris across the property.






SUGARLOAF MOUNTAIN FOREST

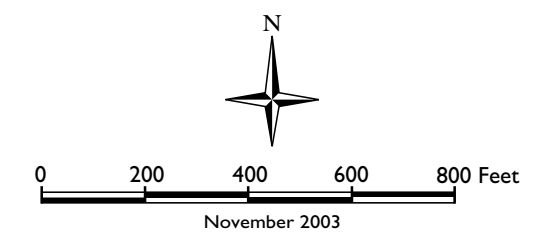
Figure 2
Map of Stand Locations
and Acreage



-  Sugarloaf Mountain Boundary
-  Streams
-  1300' Elevation Line
-  Boundary between sub-stands A & B
-  Number of Acres

Numbered Forest Stands

-  **Stand 2**
-  **Stand 1 - sub-stand A**
-  **Stand 1 - sub-stand B**
-  **Stand 3**
-  **Stand 4**



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Prepared by: DNRP GIS Unit and WLR Visual
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Forest Stand Descriptions and Recommended Treatments

The following Forest Stand Descriptions and Recommended Treatments are based in part on a forest inventory completed by staff from the King County Office of Rural and Resources Program. This inventory was done in April, 2002.

STAND 1: 229 ACRES

Stand 1 (**Figure 2**) is a regeneration stand that was established following harvest in 1994. It is the largest cover type on Sugarloaf Mountain Forest. The harvested areas were replanted with Douglas-fir, but the seedling survival has been poor due to competing vegetation and mountain beaver damage. The overstory in Stand 1 consists of scattered 40 year old residual Douglas-fir and western hemlock ranging in size from 7 inches to 17 inches DBH. The mean stand diameter for the entire stand is 2.0 inches (the mean stand diameter of the overstory is 11 inches). The ten year old Red alder and bigleaf maple saplings dominate the understory with associated Douglas-fir, western hemlock and bitter cherry saplings. The species composition based on all sampled trees greater than 0.5 inch in diameter is 36% red alder, 31% big leaf maple, 18% Douglas-fir, and 15% bitter cherry. High stocking levels of approximately 1148 trees per acre exist throughout this stand. The site index is 120 based on Douglas-fir site index curve. Understory shrub vegetation consists primarily of salmonberry, sword fern, vine maple, elderberry and the invasive Himalayan blackberry. In addition, on the south-facing slopes of Stand 1 and along the roadsides, small pockets of invasive holly, herb Robert, and butterfly bush are growing.

This stand has two primary “sub-stands”: “sub-stand A” consists of the higher elevations on the site (approximately above 1300 ft.) and “sub-stand B” consists of the lower elevation areas on the southern slope (approximately below 1300 ft). These areas were differentiated as they will receive different management treatments. This stratification was done for planning purposes. Actual treatments will be based on site conditions as determined in the field.

“Sub-Stand A” 119 acres

The reforestation efforts at these higher elevations have not been very successful due to poor soil quality, heavy mountain beaver damage and the possibility of poor planting practices following the 1994 harvest. In addition, there has been a history of root rot in this Sub-stand. Due to the excessive mortality, the upper south-western slopes of Sugarloaf Mountain were replanted with a mixture of 2175 seedlings of Douglas-fir, western red cedar and western hemlock in February and March of 2002 by Parks Maintenance and volunteer groups. Approximately 20 acres of conifer release was done in 2001 and 2002 on these upper slopes where there were adequate numbers of conifers. This release treatment will help Douglas-fir saplings compete with the deciduous species present. The patchy nature of conifer and deciduous species through out this sub-stand will improve horizontal diversity over time.

“Sub-Stand B” 108 acres

Sub-stand B occupies the lower elevations of Stand 1. The moister soils create a better site for successful red alder growth than Sub-Stand A. These areas will be managed for Red alder in the short term with conversion to coniferous stands in 30-40 years.

STAND 1. RECOMMENDED TREATMENT

Forest management practices on Stand 1 should be done when most beneficial for forest health and forest revenue. Due to stand variability and the presence of sensitive areas, the treatments detailed below may differ even within the same sub-stand.

“Sub-stand A” 119 acres:

A low level of management in “Sub-stand A” will allow for natural growth rates and forest processes to occur for at least 15 years. In this period the stand will move from the initiation stage toward the stem exclusion stage of stand development. As the crowns grow and further shade the site, the

presence of invasive plants will diminish. With the exception of periodic monitoring and road maintenance there are no forest practices needed in the 10 year time frame of this plan.

“Sub-stand B” 110 acres:

Management efforts in this Sub-stand will be focused on red alder growth in the “Red alder Harvest Unit” shown on **Figure 3**. This management unit consists of 58 acres. This area will need a precommercial thinning within the next five years (2004-2009) to maximize alder growth and stem quality (Ahrens, 2000). The sooner this treatment occurs, the better to increase the live crown while optimum height growth is occurring. If treatment is delayed beyond five years, the growth increase in diameter will be limited, and treatment will not be cost effective. The field inventory data for this stand was processed using the Landscape Management System (LMS). This software is designed to assist in stand and landscape level analysis and planning by automating the tasks of stand projection, graphical and tabular summarization, and stand or landscape visualization. A hypothetical thinning regime of 400 trees per acre was projected out 45 years using two scenarios; a no treatment option, and a precommercial thinning in 2008 grown out with out further management. (Appendix A) A cost benefit analysis will be completed in 2004 to determine if this precommercial thinning should be implemented.

Approximately 20 years after this precommercial thinning, suitable areas of stand I will be harvested for revenue and replanted with conifers. This harvest will be done in two stages using either patch or row clear-cuts. The first stage will remove 40 percent of the stand based on area. The second stage will occur approximately 10 years following the first and will remove another 50 percent of the area. The remaining 10 percent of the stand will be retained in aggregations sufficient in size (1 acre patches) to avoid excessive wind damage. Some trees with weaknesses, deformities and mortality will be retained to provide unique habitat conditions for a broader range of wildlife species.

Managing first for alder growth and harvest and *then* planting with conifer species will improve the health and biodiversity of the forest while providing revenue for long-term management and maintenance of the site. Any future forest management activities in the eastern most area of Sub-stand B will be in accordance with the Washington State Forest Practices Act standards for riparian buffers and slope stability. Using the most recent studies concerning hydrology and water quality, the King County forestry group, ecologists and basin stewards will continue to evaluate forest management in this area.

STAND 2: 55 ACRES

Stand 2 (**Figure 2**) comprises primarily areas left unharvested in 1994, and includes three patches located on the plateau and eastern slope of the property with one patch located on the northwest boundary of the site. These four separate, non-contiguous areas are similar enough in species composition, age, and density that they will be managed as a unit. With the exception of the seven acre area, the slopes are quite steep, averaging 53%. Some areas have a slope as steep as 83%. Douglas-fir and western hemlock dominate Stand 2, with some associated red alder and bigleaf maple; some of the red alder are beginning to decline from age. The DBH ranges from 5.5 to 26.5 inches, the average being 12 inches. The average age for the stand is approximately 42 years. This stand is well stocked with 248 trees per acre. The site index is 120 based on Douglas-fir site index curve. There are very few understory seedlings in this stand, mainly western hemlock with a few scattered bigleaf maples. Understory vegetation is lighter in this stand than in Stand 1 and consists mainly of ferns, with minimal shrub cover. This stand has had some minor wind throw since the last harvest along this stands interface with clear cut stand 1. A major wind storm occurred in December 2003, but the extent of the damage has not been determined. There are few invasive species in Stand 2.

STAND 2. RECOMMENDED TREATMENT

This stand should be monitored periodically for forest health. Through forest succession, the percentage of western hemlock and possibly western red cedar will gradually increase as the red alder succumbs to biological mortality.

STAND 3: 13 ACRES

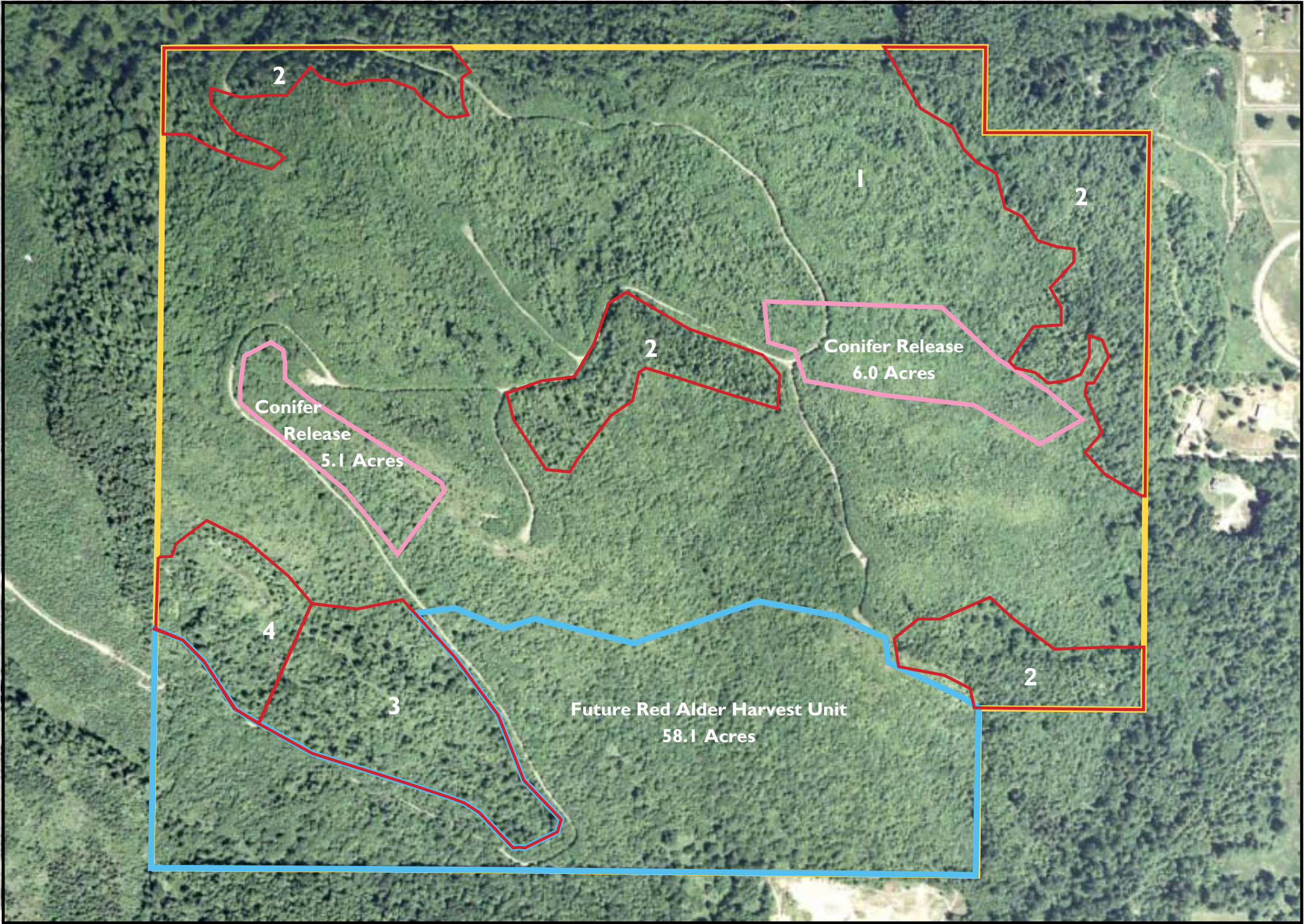
This stand (**Figure 2**) appears to have been high-grade harvested about 12-20 years ago. Not much stump evidence exists from the previous stand, but based upon site conditions it appears that the stand consisted of Douglas-fir and western hemlock. Currently the two-age stand is dominated by bigleaf maple in the over-story. The large crowned bigleaf maple re-generated by both seed and stump sprouts. The average age of the bigleaf maple is 40 years and the average DBH is 24 inches. This maple is of average quality and has low volume per acre due to the shortness of the trees. Due to the lack of tree competition in the stand initiation stage, these maples are open grown and occupy significant crown space. The understory consists of bitter cherry, red alder, bigleaf maple and dense salmonberry. The average age of the red alder understory is 10 years old.

RECOMMENDED TREATMENT

No treatment would currently be cost effective due to the previous logging practices on the stand. Stand 3 should continue to develop naturally and be managed for forest health and the exclusion of invasive plant species. The economic feasibility of a species conversion treatment to conifers should be investigated in 2014 when this plan is updated. As of 2003 the market for maple logs is starting to improve. If this trend continues it may be feasible to do the species conversion sooner than 2014. The natural development of this stand will promote canopy closure which will help limit invasive blackberries from the stand.

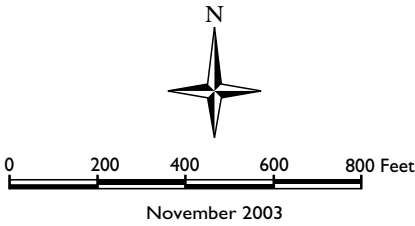
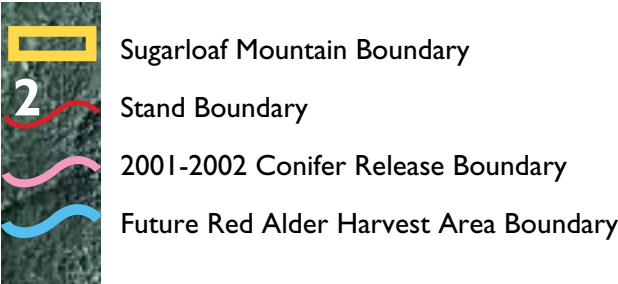
STAND 4: 6.7 ACRES. COAL MINE HAZARD AREA

See the stand description and recommended treatment that follows under Ecological Resources section.



SUGARLOAF MOUNTAIN
FOREST

Figure 3
Forest Practices Map




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ECOLOGICAL RESOURCES

Management Goals and Objectives

GOAL: PROTECT, ENHANCE AND RESTORE ECOSYSTEMS

Management Objectives:

- Apply Washington State Forest Practices Act standards for headwater seeps and steep slope protection.
- Work with the King County Green River and Cedar River Watershed stewards, ecologists and other King County staff, WADNR staff and private professionals to implement best management practices for all ecological values.
- Limit soil disturbance and maintain adequately dense understory and overstory to discourage invasive plants.
- Retain an adequate number of snags and future habitat trees on harvest areas.
- Establish formal and/or informal management agreements with adjacent landowners to protect and enhance habitat connectivity.
- Harvest only during appropriate weather and seasons to avoid soil compaction and lower the chance for erosion.
- Retain sufficient organic material to decompose on the forest floor.
- Utilize appropriate logging equipment and methods that retain soil structure and productivity, minimize soil erosion, and maintain viable understory plant communities.

GENERAL SOIL DESCRIPTION

Sugarloaf Mountain Forest is listed in the King County Sensitive Area Ordinance (SAO) as an erosion hazard area. Although across the entire site many of the slopes are steep, they appear to be relatively stable. The soils have more organic material in patches of Stand 2 located near the top of the mountain and near the road entering the property. These areas are also rich in snags and down woody debris. Stand 2 exhibits less soil compaction than Stand 1 because it was not harvested recently. Soil quality in Stand 1 is quite rocky and dry on higher elevations on the southern slope of the property. The slopes here are quite steep, averaging 65%. There has been a small landslide at the top of the southwest-facing slope, just northwest of one of the spur roads. Lower elevation patches in Stand 1 are richer in nutrients and better suited for alder management than those higher up in the stand. The following soil attributes are derived from the 1973 Soil Survey done by the USDA, Soil Conservation Survey. This Soil Survey data has not been field verified, but a site visit by a soils graduate student determined that the survey was probably fairly accurate. (Licata, pers. comm.)

TABLE 2: Soil Attributes	
Soil Type	Chuckanut Loam is the primary soil type on the property (Figure 4). The Chuckanut Loam series consists of deep, well-drained soils. The soil is gravelly loam. Loams are made up of roughly equal amounts of sand, silt, and clay. Loams tend to be fertile and hold water without becoming overly wet.
Soil Phase	15 to 30%
Major Tree Species	Douglas fir and red alder
Site Index	DF=127
Landform	Broad ridge tops, benches and mountainsides hills
Slope Shape	Concave-Convex
Parent Material	Volcanic ash over till and sandstone
Elevation Range	400-1500 feet
Precipitation Range	30-50 inches
Top Soil (Typical)	Dark yellowish brown gravelly loam
Underlying Soil Layers (Average)	Light olive brown gravelly sandy loam
% Rock Fragments (Average)	25%
Restrictive Layer	Bedrock
Soil Depth (Average)	40-60 inches
Drainage	Well drained
Permeability	Moderate
Average Water Holding Capacity	Runoff is slow or medium
Susceptibility to Compaction	Medium
Past Erosion	Minor

The recommended forest management treatments incorporate soil conservation and restoration measures.

COAL MINE HAZARD AREA DESCRIPTION

The coal mine hazard area is all of Stand 4 (**Figure 2**). Elk Coal mine was in production from 1921 to 1942 producing approximately 246,000 tons of coal on Sugarloaf Mountain Forest. There are at least four coal beds—two of which (Big and Little Elk Bed) were mined with three separate entrances. These mines are located in the southwest corner of the property according to the 1943 report. The mine was originally owned by the Elk Mining Company and sold to the Big Four Coal Company.

The Washington State Department of Natural Resources (WA DNR), Division of Geology and Earth Resources inventoried abandoned coal mines in 1984. Their report contains a map showing the location of the Big Elk coal bed running from east to west through the southern portion of Sugarloaf Mountain Forest. The bed is concealed running through the property according to the map, except in the southwest corner and in the southeast of the property. No holes were mapped on the property.

The WA DNR abandoned coal mines inventory report lists the Elk Coal mine as having five problem areas of priority 3 (lowest priority). Priority 3 is defined as “abandoned-mine-lands-related problems that represent an environmental problem to the public at large.” These problems may be rectified by “restoration of land and water resources and the environment previously degraded by adverse effects of coal mining practices” (WA DNR, 1985). The report recommends that those abandoned mines listed as Priority 1 should be reclaimed—no recommendations are made for priority 3 mines. However, the report also notes that areas in King County were not inventoried exhaustively—surveying the most accessible sites will need a more detailed inventory in the future.

The area was logged when mined and again 12-20 years ago at the same time as Stand 3. Stand 3 and Stand 4 are similar in stand characteristics except for the presence of the abandoned surface coal mine in Stand 4. This area also contains a small pond (approximately 2500 square feet). This pond is a relic from the mining use in this stand. The mining spoils were mounded, and the vegetation that is present is found between these mounds

COAL MINE HAZARD AREA. RECOMMENDED TREATMENT.

King County Comprehensive Plan Policy R-564 states that King County should “work with Washington State Department of Natural Resources to ensure that mining areas are reclaimed in a timely and appropriate manner.” Previous research (Heilman, 1982) concerning reclamation of a coal mine to a healthy forested environment in the Pacific Northwest (research was done in Centralia, Washington) found that the nitrogen status of coal mine spoils was less than half that in natural soils. In addition, foliar N concentration in Douglas-fir was lower on spoils, though nitrogen fertilizer could probably prevent the decline of Douglas-fir site indices. Although alder accumulates nitrogen and organic-matter more slowly in the coal spoils, it was able to survive sufficiently because its roots were able to penetrate the compacted soil deeper than Douglas-fir roots (Heilman, 1982).

The interim recommendation is that Stand 4 be managed for forest health and public safety. Rehabilitation of the area will happen naturally over time. Restoration of this site would be very expensive (Richter, pers. comm.). Red alder has established between the mounds and will slowly add nitrogen and organic material to the soil and improve soil productivity, biology, and structure. Given the presence of mining spoils, no active management will be done on this stand.

In 2004, staff from the Office of Rural Resource Programs will further investigate the need for a more active restoration plan with WADNR Division of Geology and Earth Resources.





The Roads and Trails section of this plan addresses liability concerns associated with this Coal Mine Hazard Area.

TOPOGRAPHY






Sugarloaf Mountain Forest is a small mountain that lies within a flat area in the foothills of the Cascade Mountain Range. The mountain rises from approximately 950 ft. to 1420 ft., with a few small hills rising another 40 to 60 ft (**Figure 4**). The slopes on the property are fairly steep.

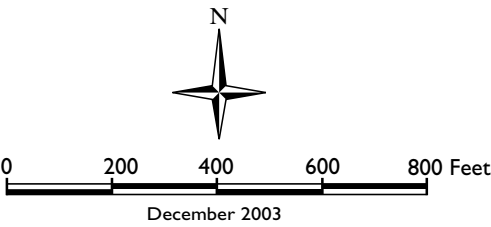
SUGARLOAF MOUNTAIN
FOREST

Figure 4
**Topography and
State Soils Map**

-  Sugarloaf Mountain Boundary
-  100 Foot Contour Line
-  20 Foot Contour Line
-  Stand Boundary

State Soil Code

-  **1328** Chuckanut loam
6 - 15% slope
-  **1329** Chuckanut loam
15 - 30% slope
-  **1330** Chuckanut loam
30 - 65% slope
-  **2000** Everett gravelly sandy loam
15 - 30% slope
-  **6144** Gravel pit

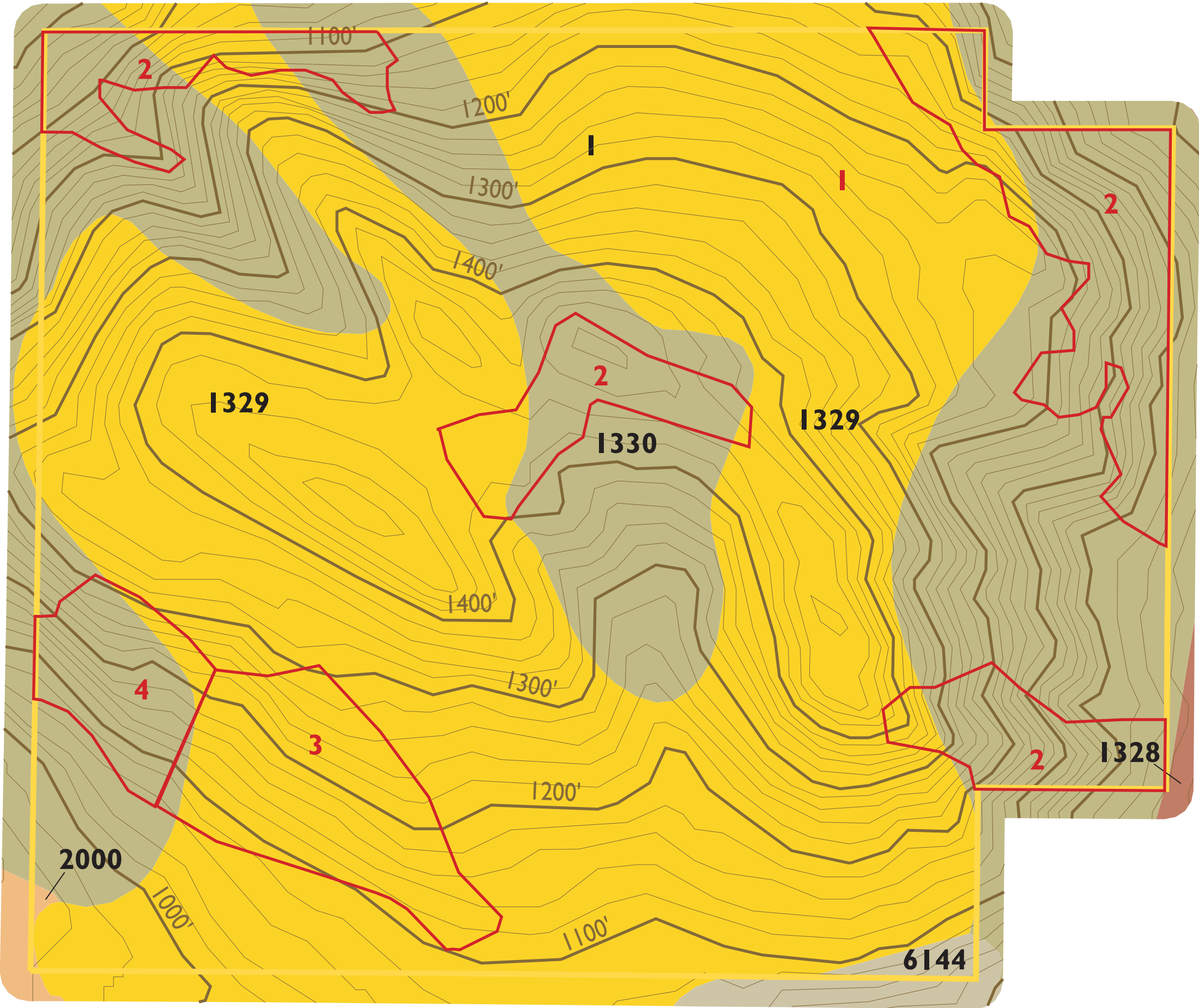



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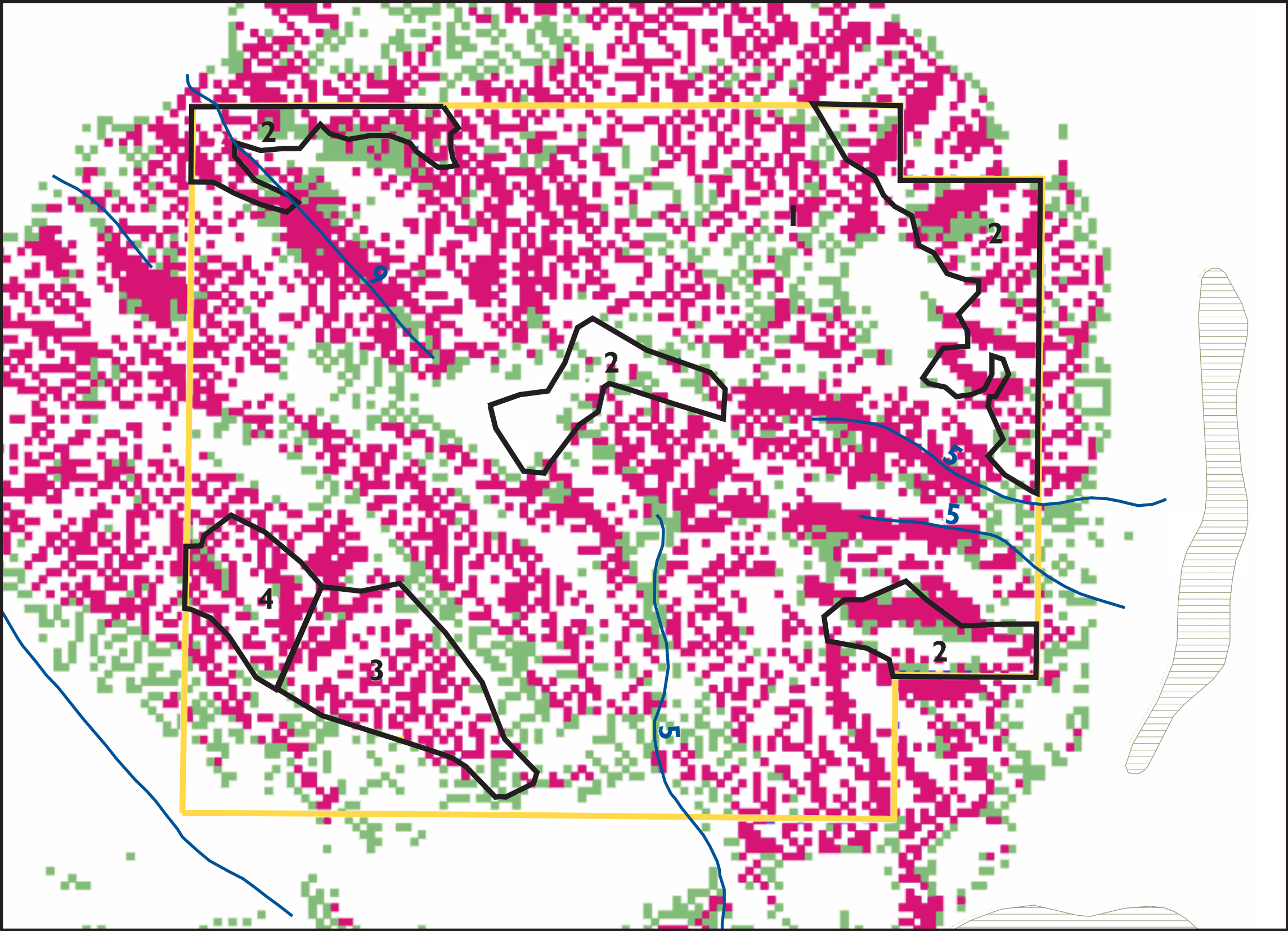


DRAINAGES, STREAMS AND WETLANDS

Sugarloaf Mountain Forest is divided between two watersheds (see **Figure 6**). The eastern half is in the Green River watershed and the western half is in the Cedar River watershed. Seven intermittent streams and seeps (WA DNR class 5, King County unclassified) drain the southeast and south slope of the property into a larger unclassified tributary of the Middle Green River, and one intermittent stream (WA DNR class 5, King County unclassified) flows into the Cedar River Basin. There is a small pond in Stand 4 (Coal Mine Hazard Area). There are no significant wetlands on Sugarloaf Mountain Forest. However, the lower eastern slope of Sugarloaf Mountain Forest contains four intermittent streams and headwall seeps that flow towards a nearby 175-acre forested wetland (King County class 2). The headwater streams and seeps are very important to this forested wetland.







Head wall seeps are important areas for amphibians, such as Van Dyke's and Larch Mountain salamanders. However, young forests, like Sugarloaf Mountain Forest, usually have lower species richness and a greater effect on the total amphibian density and biomass (Lee, 1997). Over time these forests will mature and increase in species richness.

The water absorption capability of Sugarloaf Mountain Forest is a key hydrological function the property provides. The 285 acres of intact forest cover provides ground water recharge which flows down to the above mentioned headwall seeps and intermittent streams. These streams eventually connect with the Green and Cedar rivers that provide habitat for five species of anadromous fish: chinook, coho, chum, sea-run cutthroat trout and steelhead trout. Any future forest management activities near these streams and seeps will be in accordance with the Washington State Forest Practices Act standards for riparian buffers and slope stability. (See **Figure 5**.)

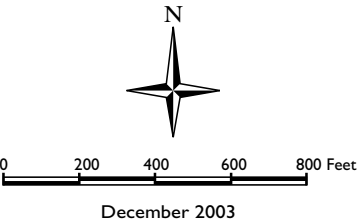


SUGARLOAF MOUNTAIN
FOREST

Figure 5
**WA DNR Forest
Practice Map**

-  Sugarloaf Mountain Boundary
-  Stand Boundary
-  Hydric Soils
-  WA DNR Stream Water Type
(9 = unknown stream type)
- Slope**
 -  Medium Slope Instability
 -  High Slope Instability

Data Source of Slope, Hydric Soils,
and Stream Type: Washington State DNR



December 2003

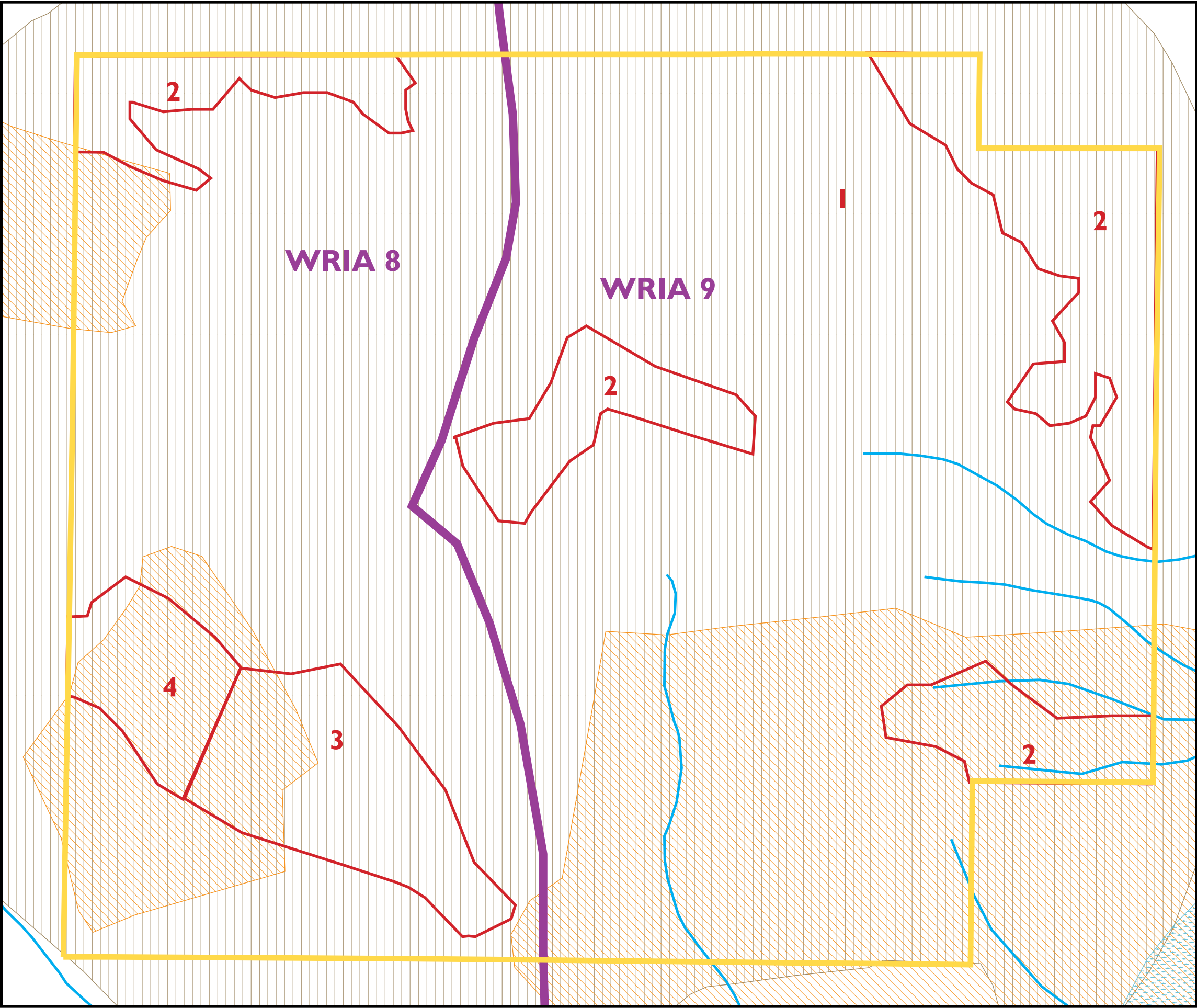


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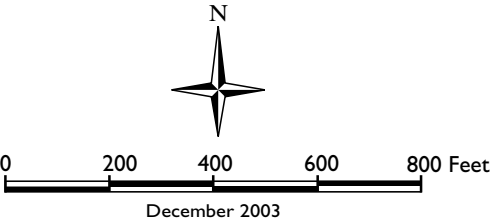
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**SUGARLOAF MOUNTAIN
FOREST**

Figure 6
King County
Sensitive Areas

-  Sugarloaf Mountain Boundary
-  Stand Boundary
-  Streams (all shown are unclassified)
-  WRIA Boundary
-  Wetlands
-  Coal Mine Hazards
-  Erosion Hazards



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WILDLIFE RESOURCES

Bird species observed or likely to inhabit the property include ruffed grouse, flicker, chickadees, winter wren, woodpecker, pygmy owl, barred owl, rufous hummingbird, varied thrush, Stellar's jay and towhee.

Small mammals such as vole, mice, chipmunk, rabbit, hare, squirrel, mountain beaver, and opossum are likely to utilize the property for food, water, and cover.

Large mammals using the site include black-tailed deer, elk, and the occasional bear. Predators using the property may include coyote, cougar, fox and weasel.

THREATENED AND ENDANGERED SPECIES

A WADNR TRAX check of the property shows no known threatened or endangered species on the property, nor are there any known cultural or historical sites on the property.

WILDLIFE HABITAT

A variety of vegetation types that are desirable for food and cover are found on the site. The major cover type is the early seral stage of Stand 1. This stand is beginning to enter the stem exclusion stage where the abundant herbaceous and shrub vegetation will gradually diminish in density as the tree canopy begins to close. Currently, the large shrubby areas provide thermal cover and protection from predators. The non native Himalayan blackberry found primarily in Stand 1 does provide significant wildlife benefits in the form of food and cover. The various silvicultural treatments will provide periodic disturbances which will help to provide a variety of vegetation types to enhance diversity of food and cover.

The four patches of Stand 2 provide small areas of 43 year old mixed species. The red alder in these stands will begin to die soon and provide dead and down wood which is lacking on the site. There are some grassy areas that are being grazed by deer and elk. A further indication of the presence of deer and elk is the preponderance of animal trails on the property.

The coal mine hazard area offers a different, yet diverse wildlife habitat that complements the conditions of the rest of the property. The steep exposed slopes, undulating terrain (coal spoils mounds), west facing aspect, and mixed conifer and shrubs provide habitat for reptiles (snakes), neotropical songbirds, and mammals.

WILDLIFE MANAGEMENT CONCERNS

Black bear, cougar and bobcat tend to require large tracts of land with little or no human development. Problems can occur where these species coexist with residential development.

Due to the history of harvesting activities on Sugarloaf Mountain Forest followed by periods of little active management, the site is lacking in diversity of forest structure. Horizontal and vertical diversity is lacking because of the dominance of young single species stands. Down, dead woody material and organic matter are lacking in Stand 1. Although none of the stands on Sugarloaf Mountain Forest exhibit old-growth structure, Stand 2 adds structural and species diversity to the property and the surrounding landscape. The dispersed patches of Stand 2 offer unique wildlife habitat functions because of their orientation, age, density, wind throw and other structural attributes. These dense mixed stands may be particularly important in providing winter cover for medium and large mammals (e.g., coyotes, bobcat, cougar, deer, elk), as well as larger birds (woodpeckers, owls, and raptors). With their closed canopy, they provide protection from wind, an open understory, abundant downed logs, and other woody debris. Snags and large woody debris that provide wildlife habitat and add to the forest structure are limited in Stand 1 and Stand 3.

There are silvicultural strategies for managing mountain beavers at low population levels. Mountain beavers have lowest densities in dense coniferous stands (complete crown closure), whereas brush openings provide suitable habitats. The prescribed forestry treatments over the next 10 years will minimize such areas and

lower populations through reduction of prime habitat and causing dispersion to new areas. When doing the recommended pre-commercial thinning, care should be taken not to over thin the alder. This will minimize openings for ferns, shrubs and hardwoods, prime mountain beaver foods. The harvest is far enough in the future (20 years) that the beaver population level will have diminished.

WILDLIFE MANAGEMENT RECOMMENDATIONS

The silvicultural practices being implemented to enhance stand health and vigor will also improve habitat conditions for many species of wildlife. However, some weaknesses, deformities and mortality should be allowed to persist to provide unique habitat conditions for a broader breadth of species. When doing harvesting, unique species or trees such as bigleaf maple for denning and bitter cherry for an additional food source should be protected.

Monitor for mountain beaver and black bear damage.

Do not create slash piles or use very small ones as these are used by mountain beavers. Moreover, rapid regeneration is important. Use large seedlings (2-1's) for restocking.

Forest management activities to enhance specific wildlife populations can be employed. In areas free of mountain beaver, brush and rock piles can be provided for denning and hibernation sites.

The encouragement of coyotes, bobcats, raptors and other predator populations would increase biodiversity on the site while simultaneously increasing predators to control mountain beavers. Providing boulder mounds, raptor roosts, managing for wildlife trees may be a beneficial management option.

Roads should be kept at minimum length, widths and condition to manage the site effectively and minimize erosion. Lightly used roads become wildlife corridors but those used by ATVs may stress wildlife. Consequently, ATV use should be curtailed or forbidden through an active enforcement program.

FOREST AESTHETICS

As the property continues to green up following the 1994 harvest, forest aesthetics are improving.

The property presents a pleasing regional view of forested slopes to people recreating in the Ravensdale–Kanaskat–Kangley areas. Managing for a healthy, diverse forest will continue to provide the pleasing regional view. If public access is obtained, view shed management for passive recreational use should be pursued.

ROADS AND TRAILS

Management Goals and Objectives

GOAL: IMPROVE AND/OR MAINTAIN FOREST ROADS

Management Objectives:

- Develop road plan.
- Design timber harvests to minimize the impacts of new and existing roads.
- Discourage public use unless appropriate public access is developed.

SITE ACCESS

Access to Sugarloaf Mountain Forest is currently through a gravel road easement off of SE Kent-Kangley Road (easement recording # 20001220000218). There is a locked gate at the beginning of this road easement that is accessible only to King County staff and the right of way holder.

PUBLIC ACCESS

There is no legal public access currently to the Sugarloaf Mountain Forest. However, public use does occur on the property by entering the site through adjacent private land, especially the Plum Creek property to the west. King County may pursue acquisition of an easement or portions of the property in fee from Plum Creek to develop a regional trail connector entering Sugarloaf Mountain Forest from the west side, running along the southern boundary of the property and exiting through the southeast corner (**Figure 7**).

The proposed future regional trail connector will continue east to Kanaskat-Selleck road.

ROADS

The access road enters Sugarloaf Mountain Forest from the northwest boundary of the site and cuts through the property extending first east then west in an “s” shape and exits the property above the southwest corner of the site (**Figure 7**). The road continues on through Plum Creek property and out to SE Kent-Kangley Road. There are three spur roads, two on the south slope of the property and one on the north slope off the main road. All roads on Sugarloaf Mountain Forest have been mapped using GPS. These road spurs offer impressive views of Mt. Rainer on the south slopes and the Seattle skyline on the north slopes.

The main road and the spurs are in fairly good condition with the exception of a washout and road erosion near the border of the property with Plum Creek and the coal mine hazard area. The erosion is caused by excessive illegal use of ATVs and mountain bikes. The best option in restoring this road may be to wait and see if King County will be purchasing any of the Plum Creek property. There has not been any resource damage that can not be restored, and the site has stabilized until the next significant rain storm. Plum Creek’s property has had major disturbances and litter problems in this area, and if the county acquires this area, it will have public use problems.

The main road was graded and had some broad base dips installed in early 2004. There are few culverts on the Sugarloaf Mountain Forest site and the condition of these culverts is unknown. A road maintenance plan will be done for this site before applying for a WA DNR forest practice permit. In conjunction with this plan, a trail plan will be done. This plan will inventory and map all roads, trails, and culverts on the property. This plan will determine what roads, if any, will be decommissioned, and establish improvements and maintenance needs for roads and culverts.

TRAILS

The existing roads also serve as the primary trails on Sugarloaf Mountain Forest. There are also a few unmapped single-track trails on the property. Horseback riders, hikers, mountain bikers, and ATV riders all use the roads and trails. King County Park rules do not allow motorized vehicles on resource lands and enforcement of these rules needs to occur on Sugarloaf Mountain Forest. In all likelihood, some of the gravel roads will be abandoned after the precommercial thinning and allowed to regenerate naturally or through reforestation. These decommissioned roads will serve nicely as multi use trails, when appropriate public access is developed.

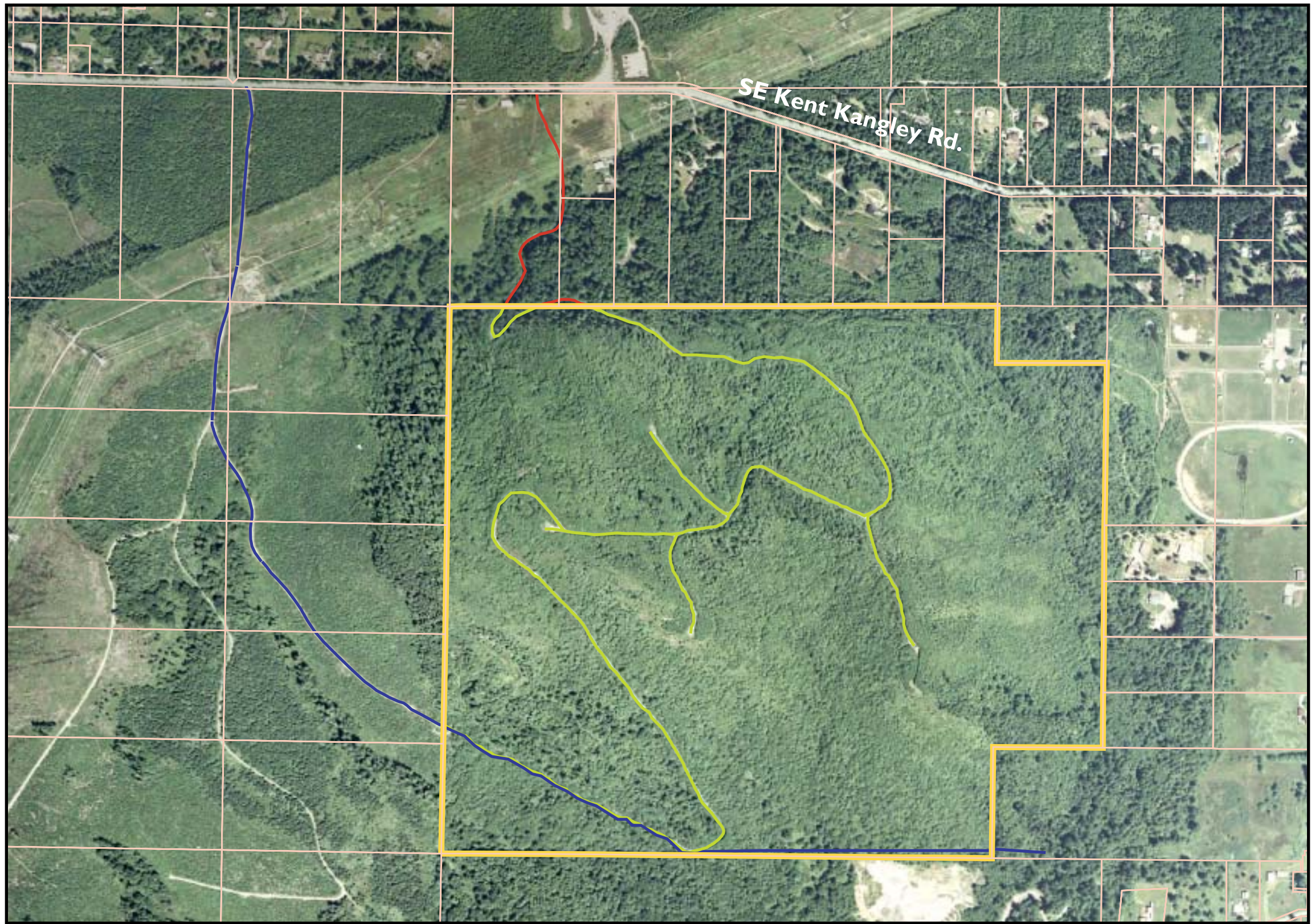
Currently, funding for the regional trail connector is still in process. King County Parks Division may acquire easements or properties from Plum Creek lands to the west of Sugarloaf Mountain Forest and private property from the southeast to provide this regional trail connection, as well as, provide appropriate access to the site.

COAL MINE HAZARD AREA AND ROADS

The road that leads out the southwest corner of Sugarloaf Mountain Forest to the Plum Creek property runs near the coal mine hazard area (Stand 4). Due to the road's proximity to the coal mine hazard area, the road should be carefully monitored for its long-term integrity and risk to public safety. King County may choose to hire a consultant or obtain the expertise of the Washington Department of Natural Resources, Geology and Earth Resources Division to look at the long-term viability of this road before developing public access.






SPECIFIC RECOMMENDATIONS:

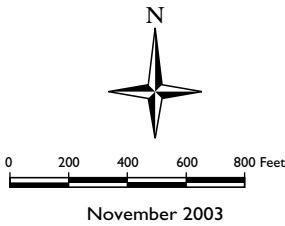
- Post site rules and enforce the no motorcycling restriction.
- Monitor the washout and road erosion in the south east corner of the property adjacent to the Plum Creek property.
- Complete a road maintenance plan.
- Consider hiring a consultant to investigate the road and public risk of the coal mine hazard area.
- Provide public access to Sugarloaf Mountain Forest in conjunction with the linkage of the Green River Regional Trail to the Cedar River Regional Trail.



SUGARLOAF MOUNTAIN FOREST

Figure 7
Roads and Trails Map

-  Sugarloaf Mountain Boundary
-  Potential Regional Trail Connection
-  Sugarloaf Roads
-  Private Right of Way
-  Adjacent Parcels



November 2003



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EDUCATION AND INTERPRETATION

Management Goals and Objectives

GOAL: PROVIDE FOR APPROPRIATE EDUCATIONAL OPPORTUNITIES.

Management Objectives:

- Work with local community groups and individuals to ensure the long-term stewardship of Sugarloaf Mountain Forest
- Provide educational/public-outreach experiences when implementing forest management practices
- Use the Parks Interpretation Master Plan to develop a “working forest/farmland” signage program
- Base interpretation efforts on the information contained in this forest stewardship plan

Once public access issues have been addressed and developed, Sugarloaf Mountain Forest has a wide variety of potential education and interpretation values that should be explored. The site may have education/interpretation opportunities that highlight forestry in King County and possibly the history of coal mining. Using the King County Parks Master Interpretive Plan (draft), King County staff should modify themes about forestry/forests developed for Taylor Mountain Forest to fit the unique features of Sugarloaf Mountain Forest. Sugarloaf Mountain Forest was not identified as a primary land unit for “interpretation focus” in the Master Interpretive Plan, however, if a regional trail connection is developed for the site, many opportunities will exist for interpretation. Below are a few possible education/interpretation proposals that should be explored when public access is developed and if funds for Sugarloaf Mountain Forest are sufficient to support an interpretive program.

PROPOSALS FOR EDUCATION AND INTERPRETATION

- **Forest Steward Program/Friends of Sugarloaf Mountain Program**
Recruit a forest steward similar to a park ambassador and possibly a “Friends of Sugarloaf Mountain Forest” group to help manage and monitor the property as a working forest.
- **Forest Demonstration Projects**
Invite neighbors, small landowners, public officials, and other interested people to Sugarloaf Mountain Forest during major forestry operations to demonstrate best management practices and reiterate the importance of forestry in King County.
- **Interpretive Signs about Forestry**
Have well-placed signs (particularly along the potential regional trail link through Sugarloaf Mountain Forest) that explain how the site is managed for both timber revenue and forest health and why sustainable forestry is important to King County.
- **“Walk in the Woods”**
Organize interpretive walks on Sugarloaf Mountain Forest with King County forestry staff to educate the general public about different issues when managing forestlands in King County (i.e. poor off road vehicle practices, indiscriminant trail building and forest management practices—conifer release, reforestation, precommercial thinning, stream buffers etc.).
- **Interpretive Signs about the Coal Mine**
Use some of the original mining documents about the Elk mine to develop an interpretive program along the potential regional trail link near the coal mine area. However, these signs should be accompanied with stern warnings about the dangers of the coal mine area and prohibit users from entering the area.

20 YEAR FOREST MANAGEMENT TIMELINE FOR SUGARLOAF MOUNTAIN FOREST

Year	Management Activity	Project Management
On-going	Annual maintenance costs (i.e. monitoring, invasive plant removal, etc.).	Parks Division
On-going	Annual monitoring of forest health.	WLRD Forestry Program
On-going	Periodic monitoring of road and trails.	Parks Division and WLRD Forestry Program
2004	Install broad based dips, and perform other needed maintenance.	Parks Division
2004	Develop and post site rules with appropriate signage for the site. Give presentation to Friends of Rock Creek on rationale behind these rules. Enforce “no motorcycling” restriction.	ORRP/Parks Division
2004-2005	Stand 1b. Prepare cost benefit analysis of precommercial thinning of 58.1 acres.	WLRD Forestry Program
2004	Develop Road Maintenance Plan.	Parks Division and WLRD Forestry Program
2004-	Stand 4. Consult with WADNR Geology Division on the costs/benefits of a more active restoration plan for coal mine area and the potential liability of roads and trails in this area.	ORRP
2004-2009	Develop public access with the development of a regional trail connector between Green River regional trail and Cedar River regional trail. Public access will be developed along with the regional trail connector.	Parks Division
2005-2008	Evaluate the costs and benefits of suggested wildlife enhancement practices.	TBD
TBD	Evaluate the options and cost of education/interpretation programs to be implemented in conjunction with forest practices.	ORRP
2014	Update Forest Stewardship Plan. Evaluate the economic feasibility of converting Stand 3 to a mixed conifer stand.	WLRD Forestry Program
2020-2030	Harvest red alder from Stand 1.	TBD
2021-	Replant Stand 1 with a mixture of conifer species.	TBD

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PERSONAL COMMUNICATIONS:

- Licata, Chris. 2003. Graduate Student. College of Forest Resources, University of Washington, Seattle, WA.
- Loeber, Bill. 2003. Forester, Program Manager. King County Department of Natural Resources and Parks, Seattle, WA.
- Richter, Klaus. 2003. Senior Ecologist. King County Department of Natural Resources and Parks, Seattle, WA.

APPENDIX A

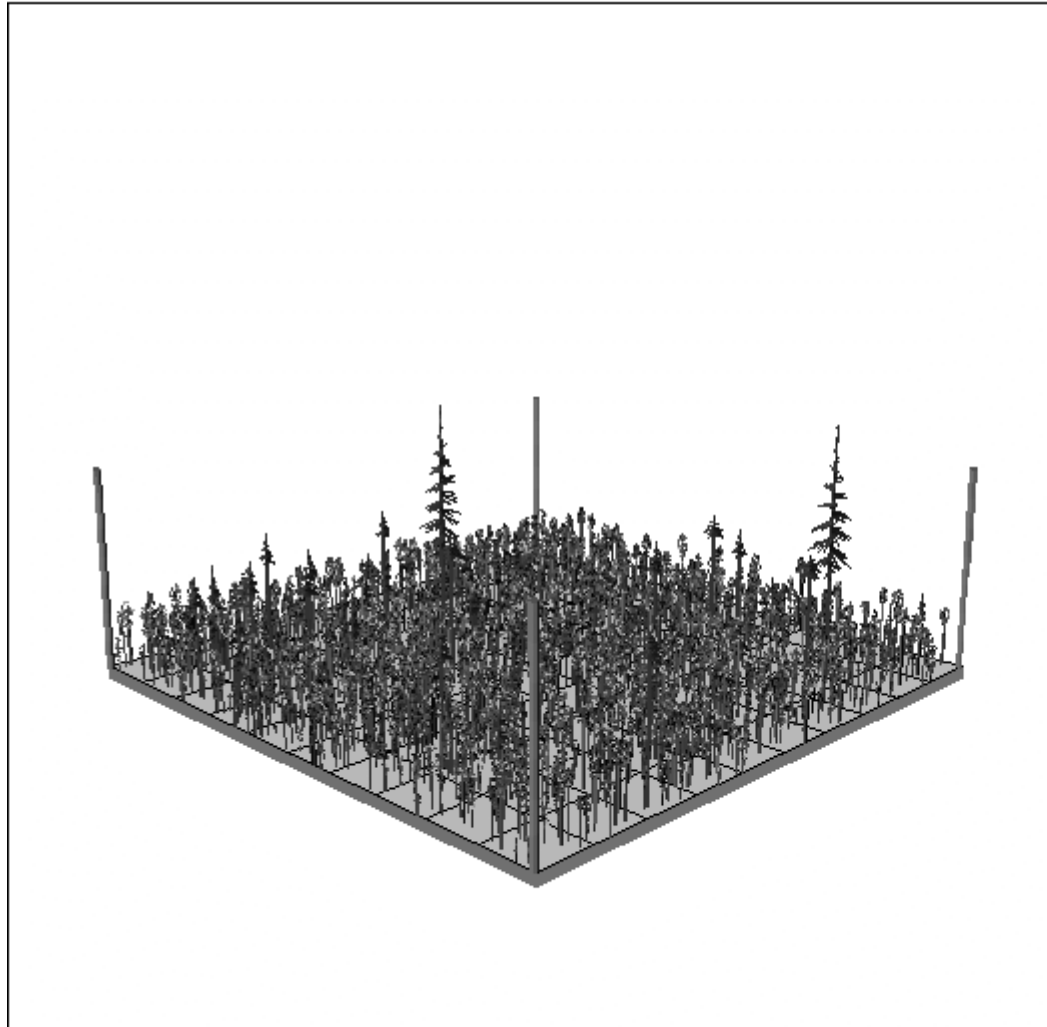
Precommercial Thinning Versus No Treatment Visualization, Graphs, and Tabular Data

*The following visualization was prepared by Michael Beevers,
an intern from the College of Forest Resources at the University of Washington.*

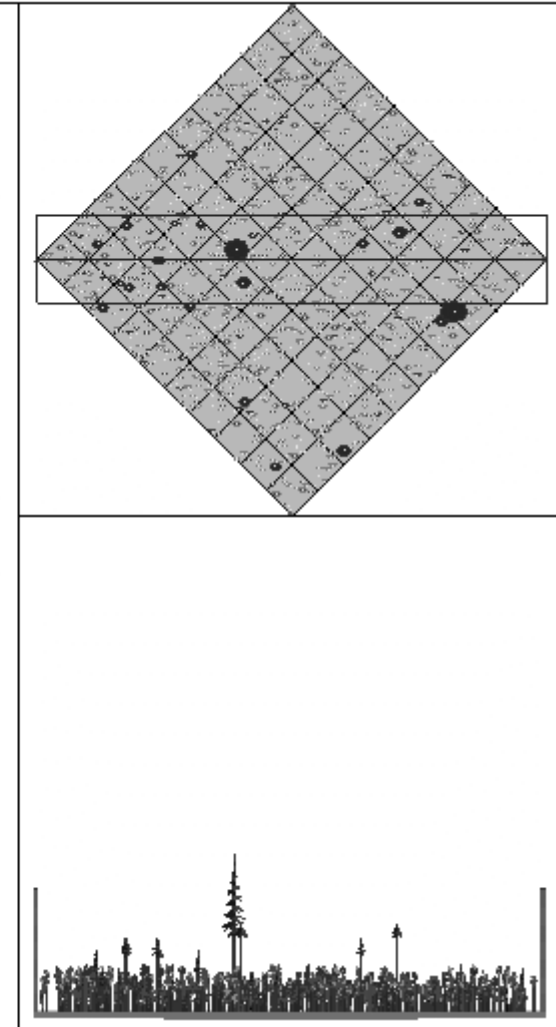
*This appendix was prepared to show the capability of using the
Landscape Management System. This component will not normally
be part of a County Forest Stewardship Plan.*

Stand 1b 2002 - No Treatment/Original Stand

Stand1B - 2002



Stand1B-2002.svs

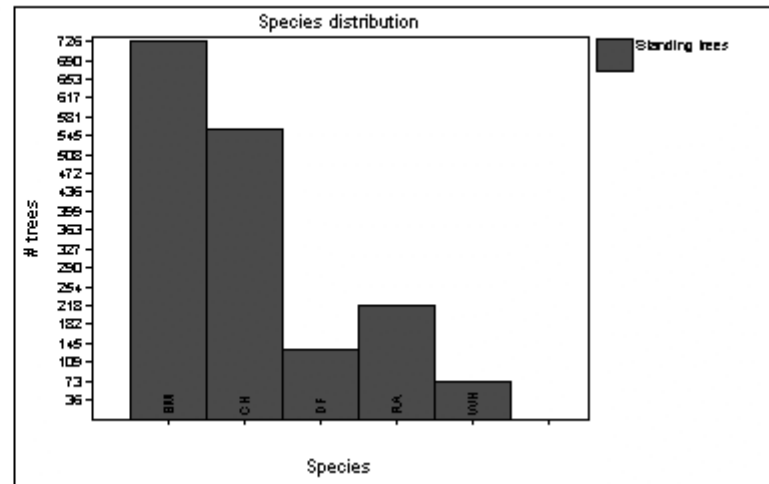
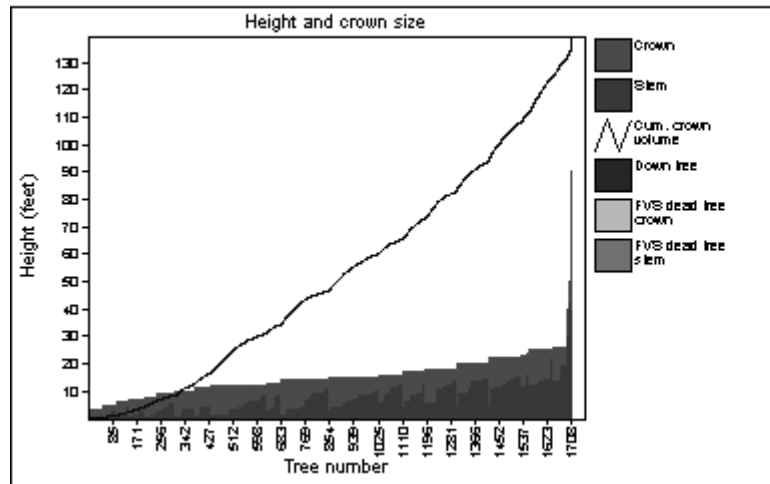
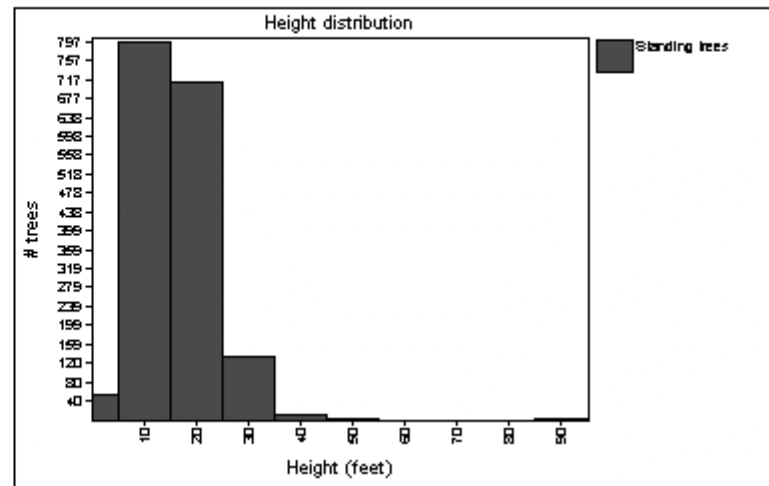
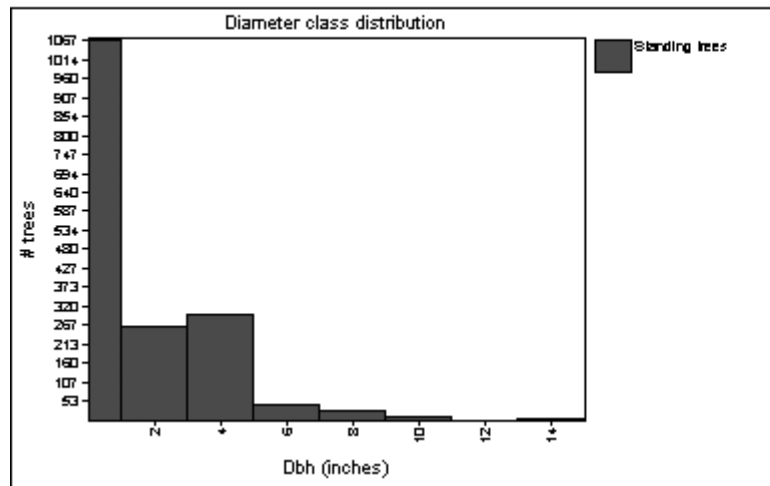


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Stand 1b - No treatment - Original Stand

Stand1B - 2002

Stand1B-2002.svs



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Stand 1b - No Treatment / Original Stand

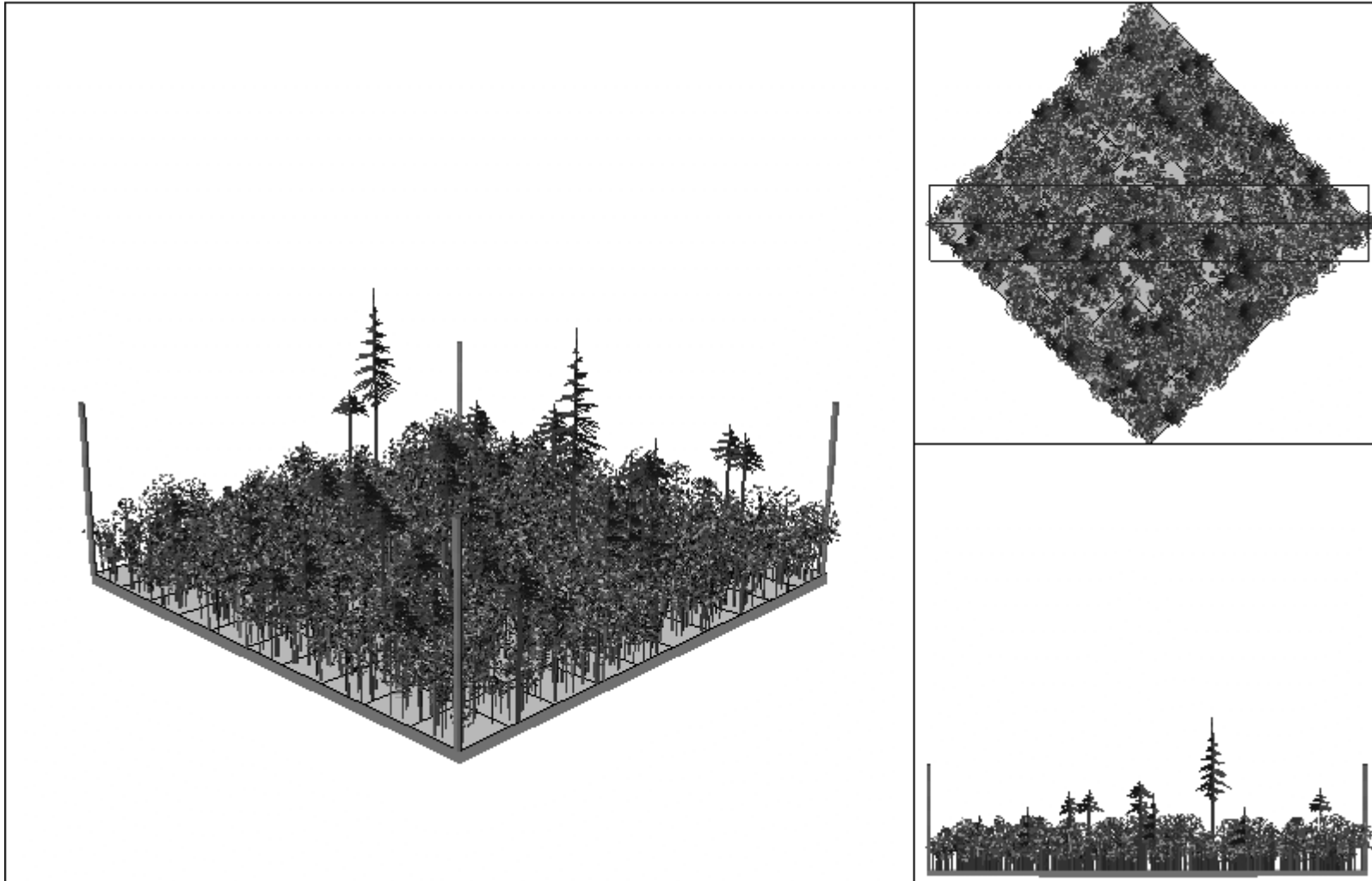
Stand1B - 2002				
File: G:\Forestry\LMS\Sugarloaf91903\Cache\Stand1B-2002.svs				
Summary is for all species				
Tree list summary:				
Origin:	(0.0,0.0)			
Size:	208.7 by 208.7 (1.00 acres)			
Units:	ENGLISH			
Total objects:	1712	(1712 per acre)		
Standing live trees (using FVS plant class codes):				
	Mean	SD	Min	Max
dbh	1.7	1.6	0.1	14.0
ht	15.0	6.8	2.0	90.0
Basal area:			48.7	(48.7 per acre)
Number of trees:			1708	(1708 per acre)
Standing dead trees (using FVS plant class codes):				
No FVS standing dead trees to summarize				
Downed trees and logs (status code 0, 10, 3, or 13):				
No downed logs to summarize				

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Stand 1b No Treatment 2008

Stand1B - 2008

Stand1B-2008.svs

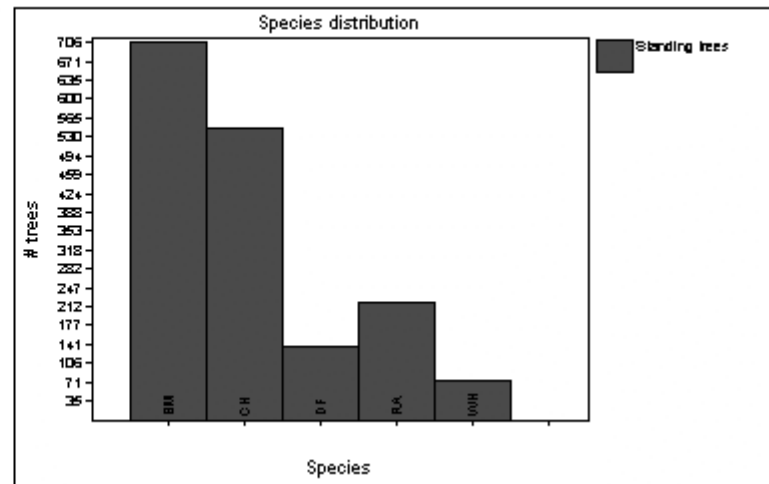
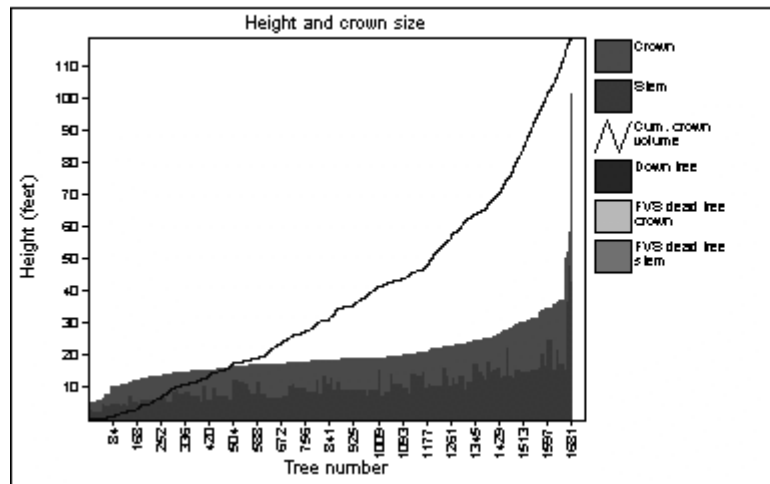
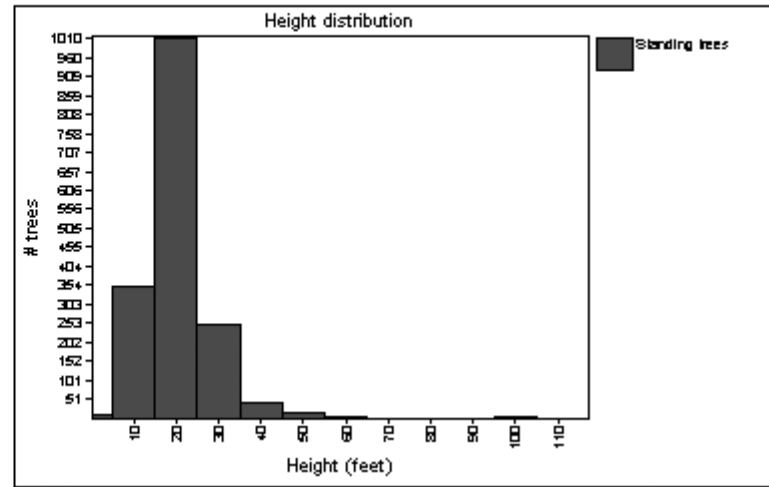
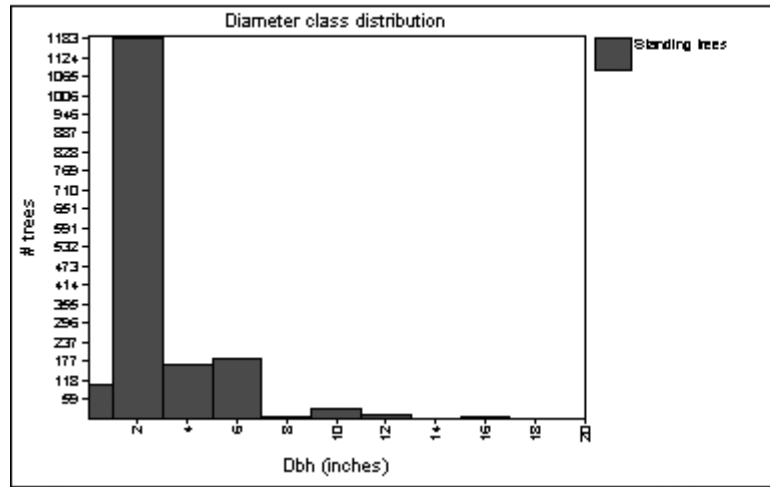


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Stand 1b - No Treatment 2008

Stand1B - 2008

Stand1B-2008.svs



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Stand 1b - No Treatment 2008

Stand1B - 2008

File: G:\Forestry\LMS\Sugarloaf91903\Cache\Stand1B-2008.svs

Summary is for all species

Tree list summary:

Origin: (0.0,0.0)

Size: 208.7 by 208.7 (1.00 acres)

Units: ENGLISH

Total objects: 1685 (1685 per acre)

Standing live trees (using FVS plant class codes):

	Mean	SD	Min	Max
dbh	2.4	2.1	0.1	16.1
ht	19.8	8.1	4.2	101.5

Basal area: 92.6 (92.6 per acre)

Number of trees: 1681 (1681 per acre)

Standing dead trees (using FVS plant class codes):

No FVS standing dead trees to summarize

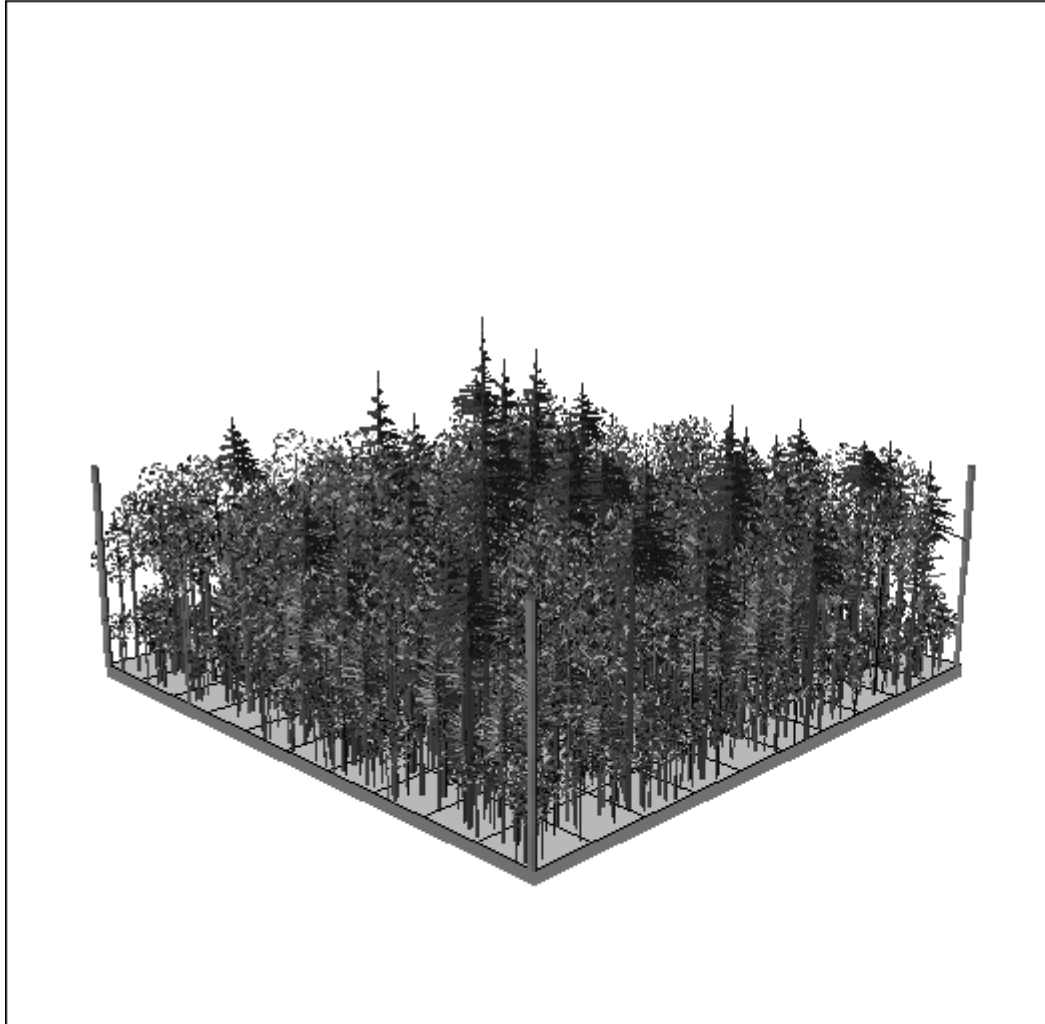
Downed trees and logs (status code 0, 10, 3, or 13):

No downed logs to summarize

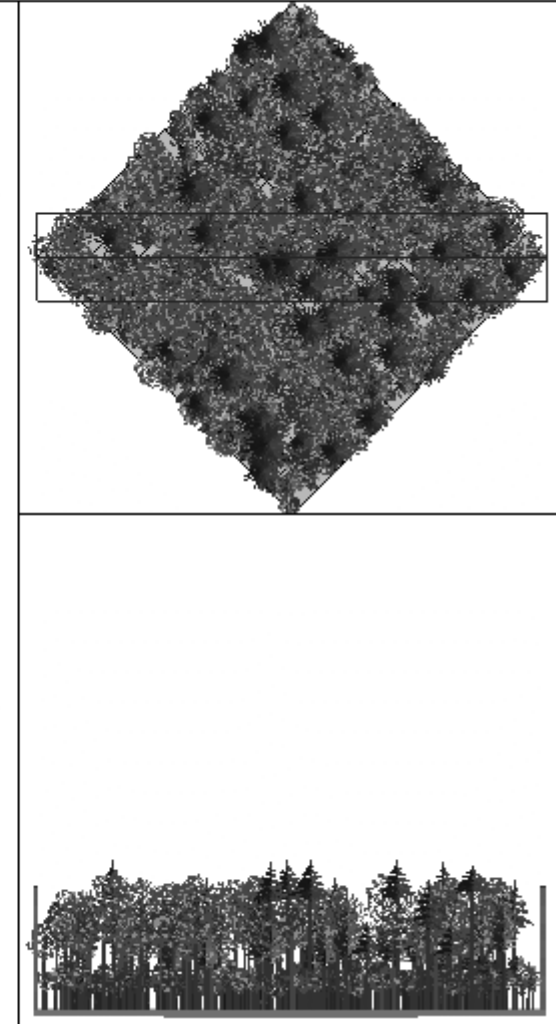
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Stand 1b - No Treatment - 2028

Stand1B - 2028



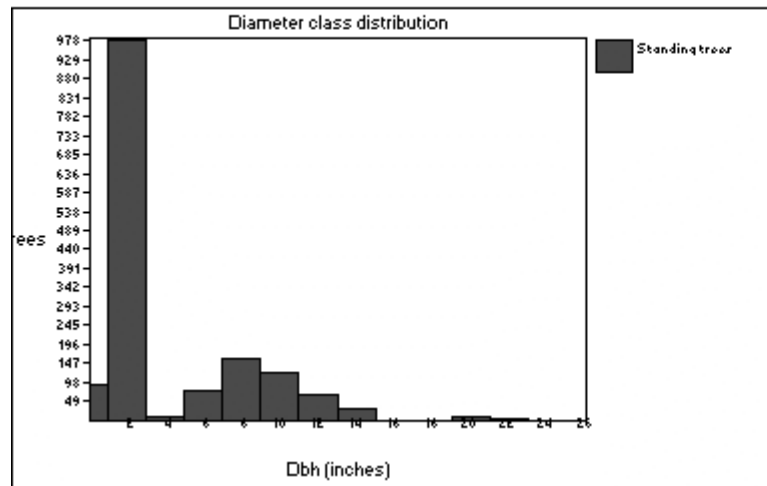
Stand1B-2028.svs



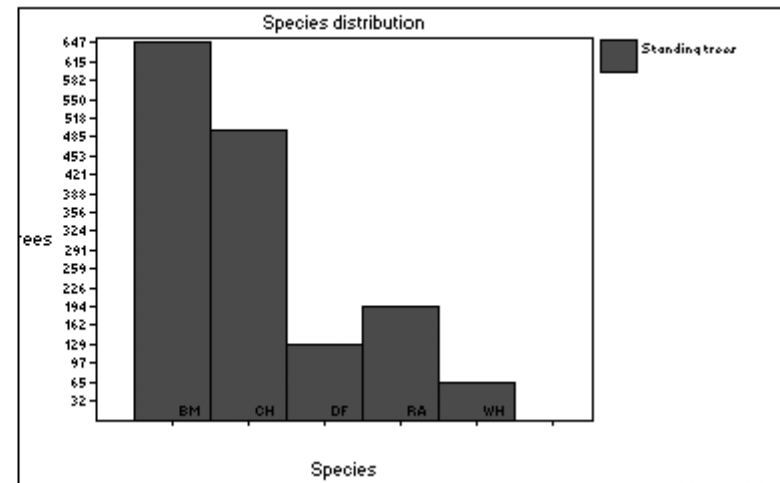
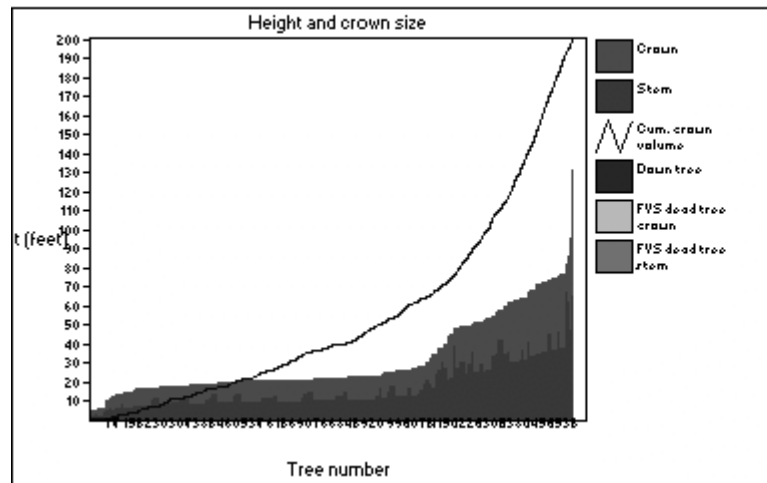
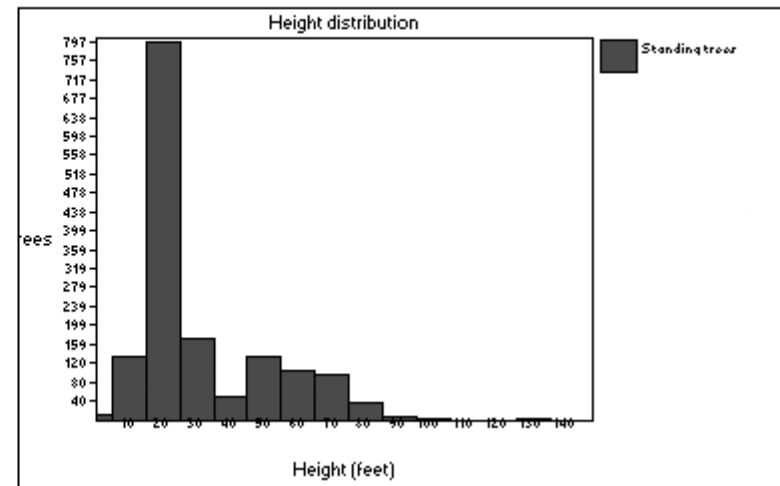
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Stand 1b - No Treatment - 2028

Stand1B - 2028



Stand1B-2028.svs



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Stand 1b - No Treatment - 2028

Stand1B - 2028

File: G:\Forestry\LMS\Sugarloaf91903\Cache\Stand1B-2028.svs

Summary is for all species

Tree list summary:

Origin: (0.0,0.0)

Size: 208.7 by 208.7 (1.00 acres)

Units: ENGLISH

Total objects: 1537 (1537 per acre)

Standing live trees (using FVS plant class codes):

	Mean	SD	Min	Max
dbh	3.9	3.8	0.1	22.1
ht	31.0	19.8	4.1	131.6

Basal area: 248.9 (248.9 per acre)

Number of trees: 1533 (1533 per acre)

Standing dead trees (using FVS plant class codes):

No FVS standing dead trees to summarize

Downed trees and logs (status code 0, 10, 3, or 13):

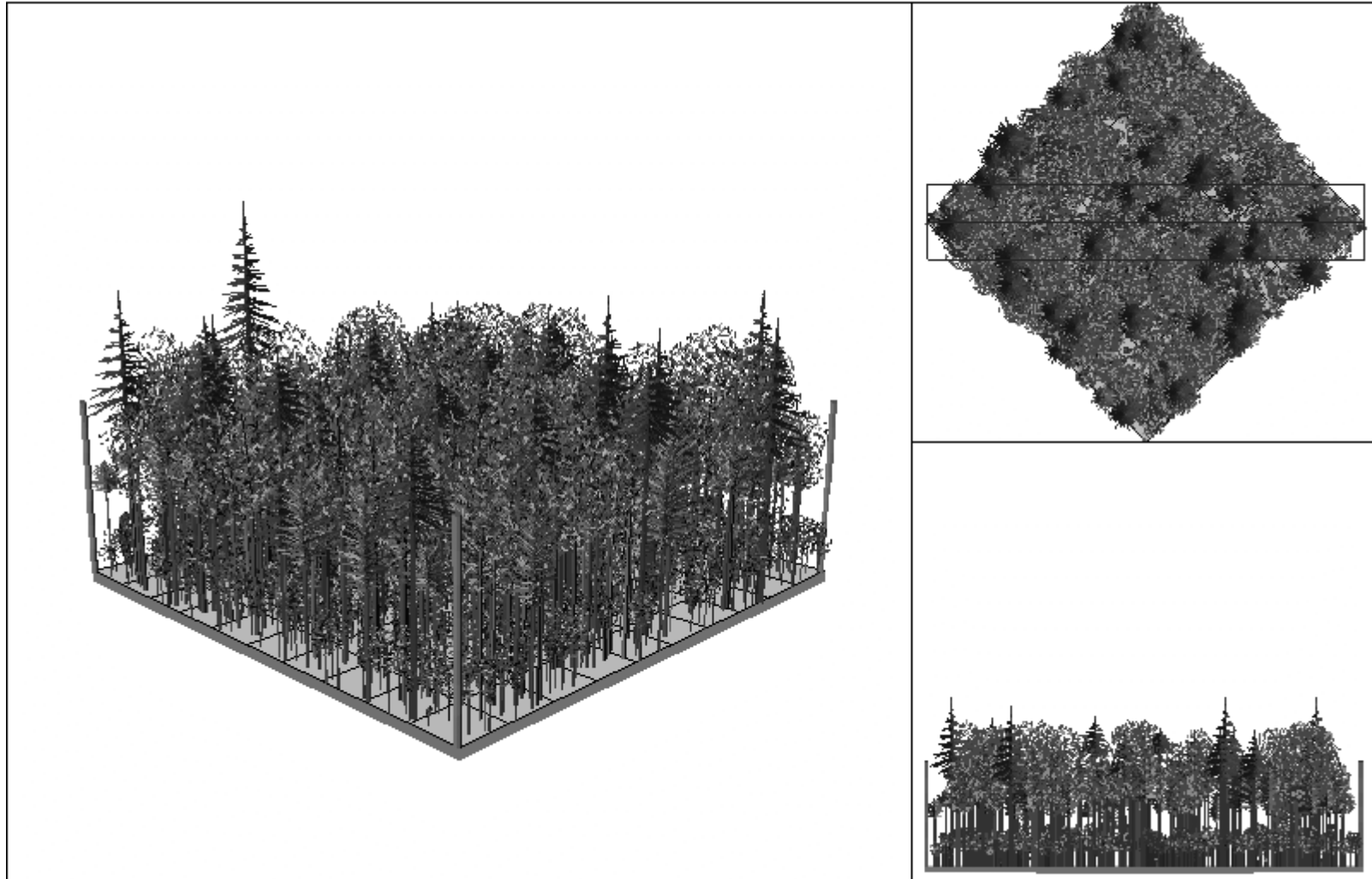
No downed logs to summarize

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Stand 1b - No Treatment 2038

Stand1B - 2038

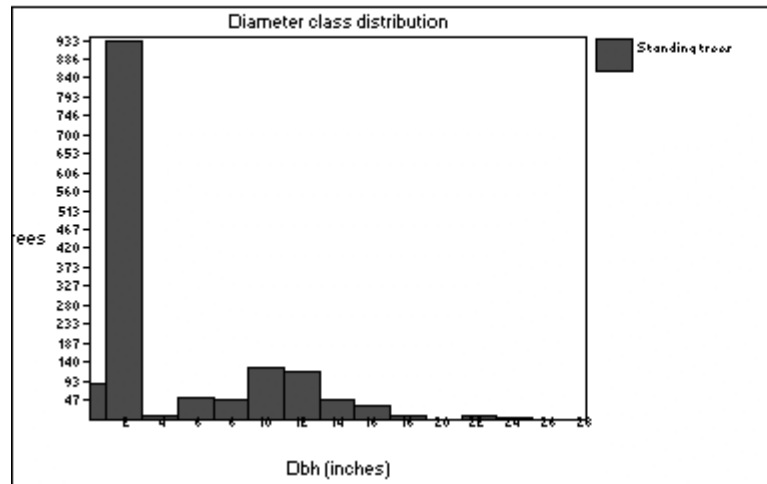
Stand1B-2038.svs



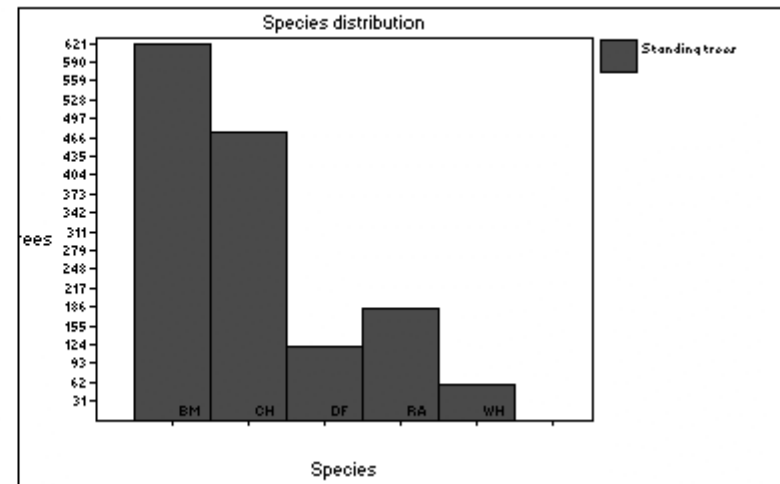
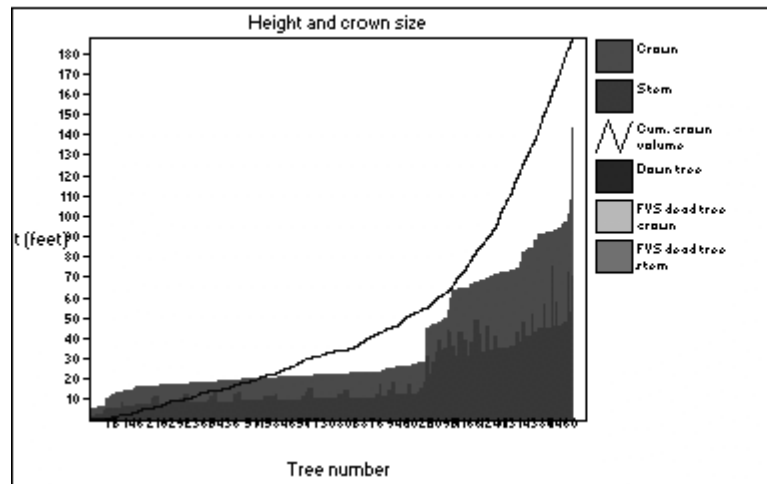
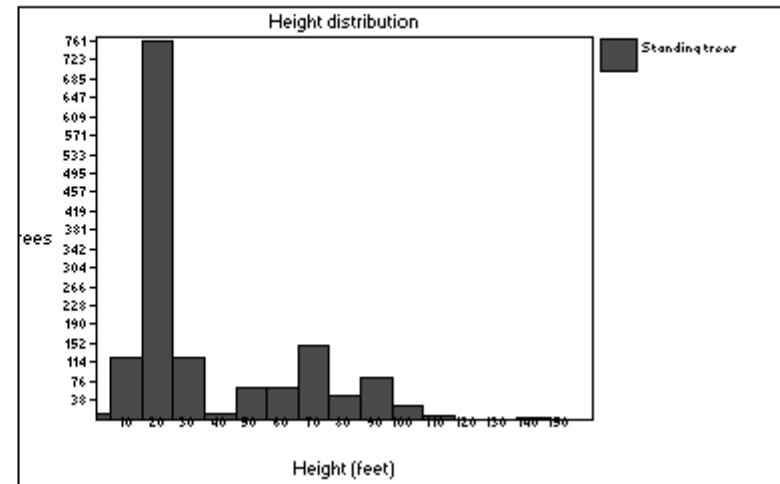
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Stand 1b - No Treatment 2038

Stand1B - 2038



Stand1B-2038.svs



Stand 1b - No Treatment - 2038

Stand1B - 2038

File: G:\Forestry\LMS\Sugarloaf91903\Cache\Stand1B-2038.svs

Summary is for all species

Tree list summary:

Origin: (0.0,0.0)

Size: 208.7 by 208.7 (1.00 acres)

Units: ENGLISH

Total objects: 1464 (1464 per acre)

Standing live trees (using FVS plant class codes):

	Mean	SD	Min	Max
dbh	4.4	4.6	0.1	24.6
ht	35.6	26.6	4.1	143.3

Basal area: 318.2 (318.2 per acre)

Number of trees: 1460 (1460 per acre)

Standing dead trees (using FVS plant class codes):

No FVS standing dead trees to summarize

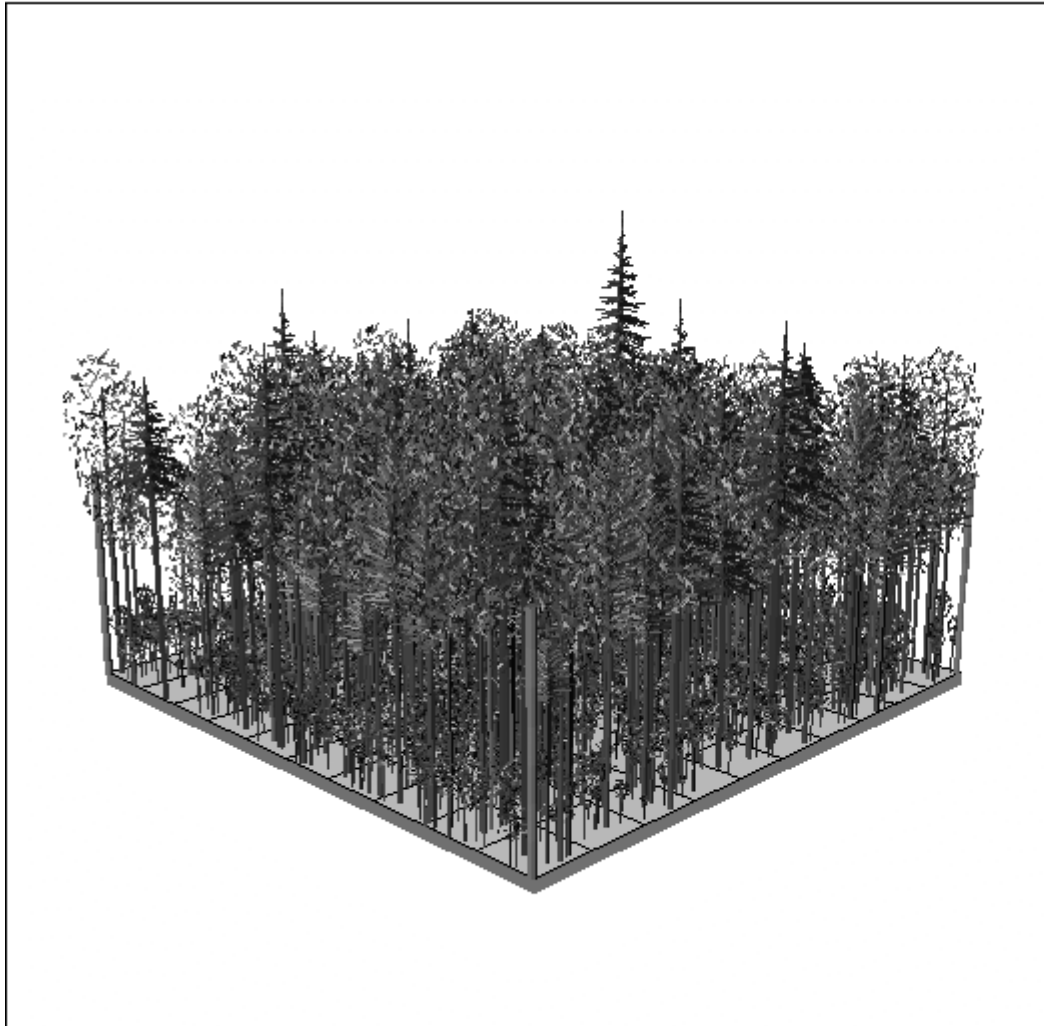
Downed trees and logs (status code 0, 10, 3, or 13):

No downed logs to summarize

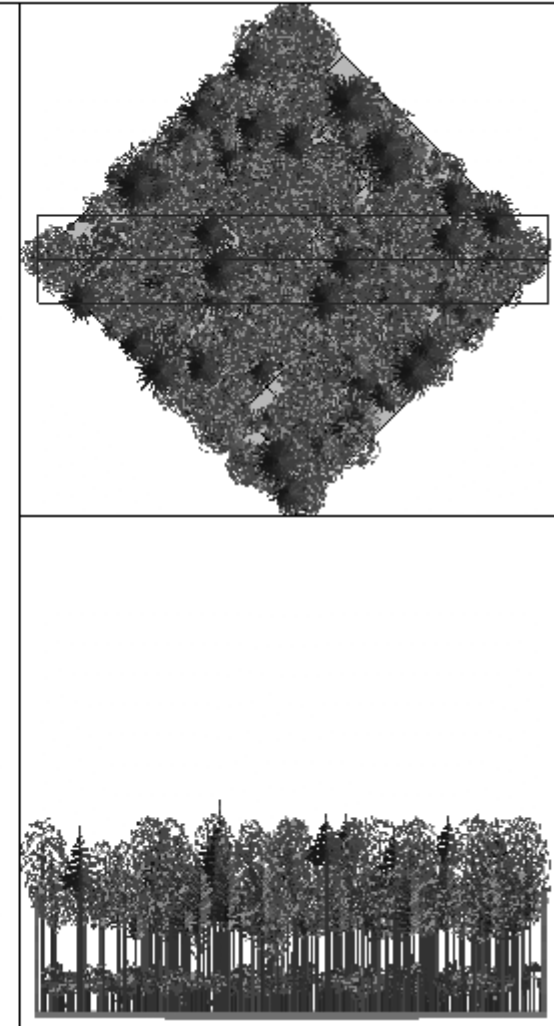
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Stand 1b - No Treatment - 2048

Stand1B - 2048



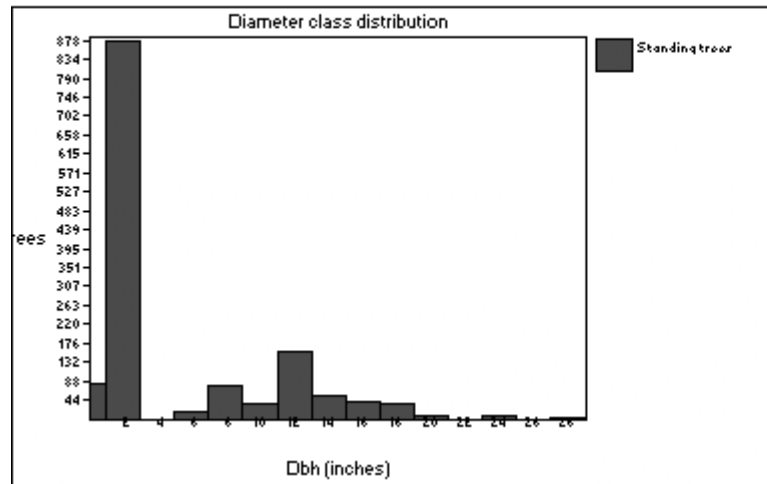
Stand1B-2048.svs



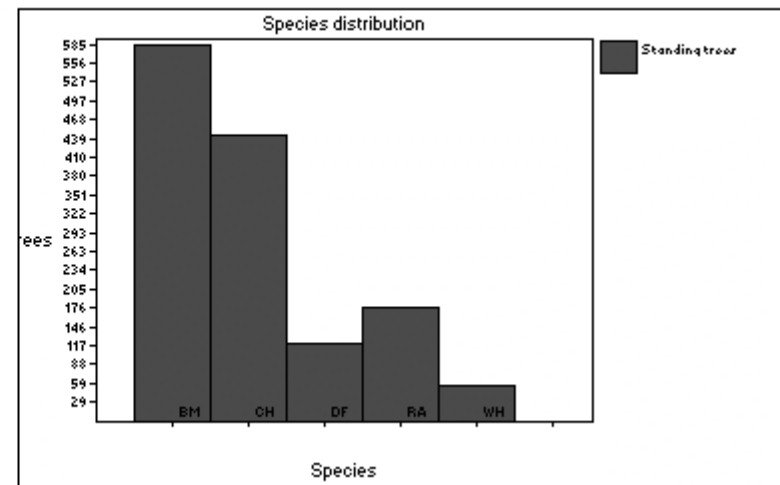
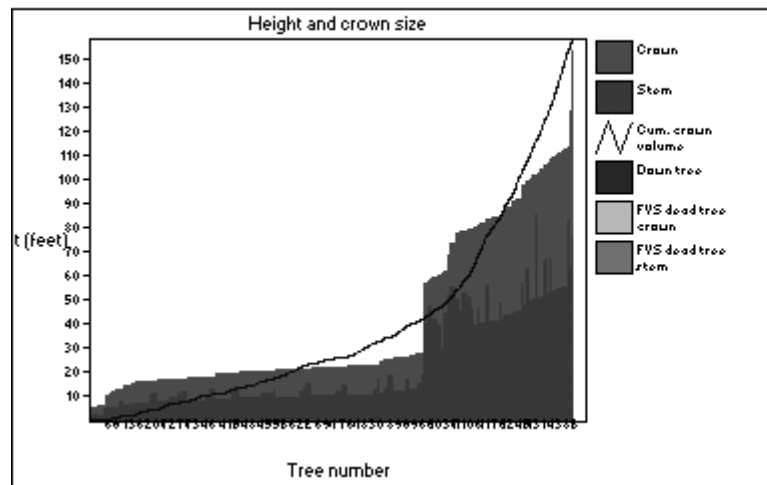
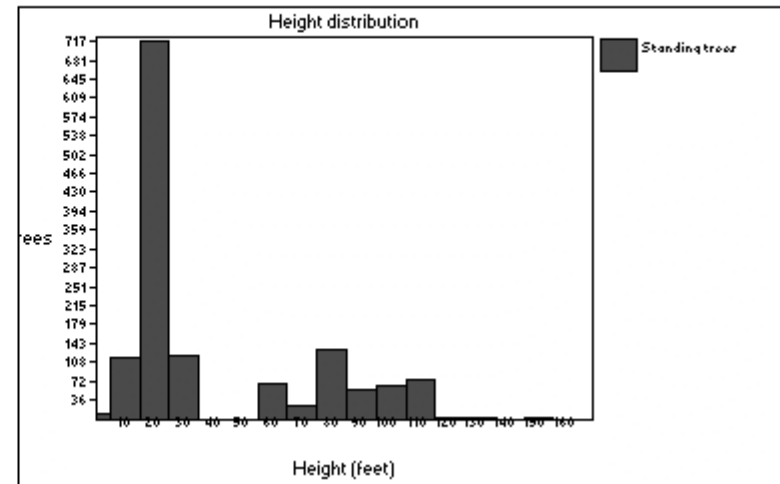
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Stand 1b - No Treatment - 2048

Stand1B - 2048



Stand1B-2048.svs



Stand 1b - No Treatment - 2048

Stand1B - 2048

File: G:\Forestry\LMS\Sugarloaf91903\Cache\Stand1B-2048.svs

Summary is for all species

Tree list summary:

Origin: (0.0,0.0)

Size: 208.7 by 208.7 (1.00 acres)

Units: ENGLISH

Total objects: 1387 (1387 per acre)

Standing live trees (using FVS plant class codes):

	Mean	SD	Min	Max
dbh	4.8	5.3	0.1	27.1
ht	40.1	32.8	4.1	153.0

Basal area: 388.7 (388.7 per acre)

Number of trees: 1383 (1383 per acre)

Standing dead trees (using FVS plant class codes):

No FVS standing dead trees to summarize

Downed trees and logs (status code 0, 10, 3, or 13):

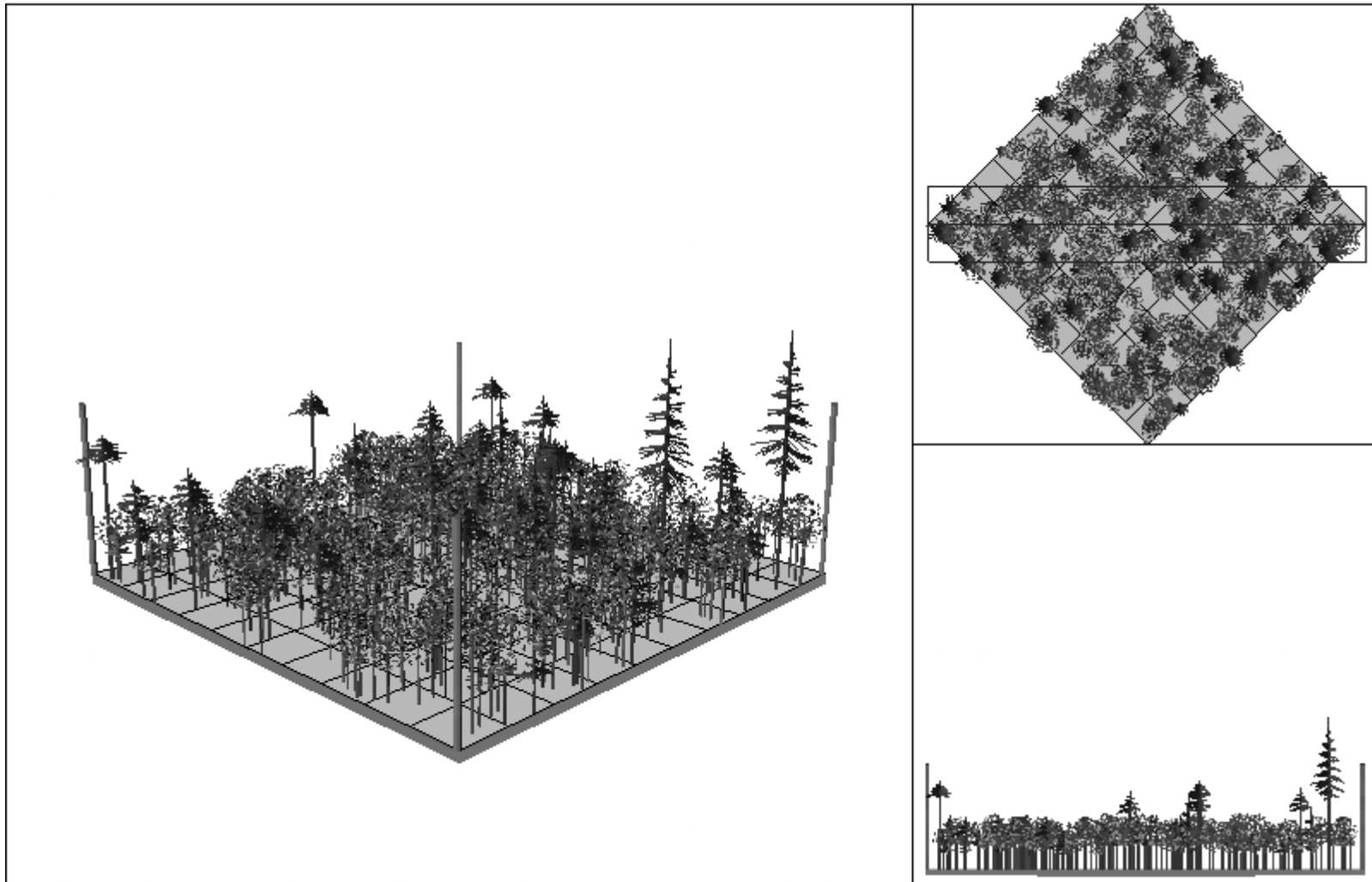
No downed logs to summarize

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Pre-commercially Thinned - 2008.
Thin from below to 400TPA (canned scenario)

Stand1B - 2008

Stand1B-2008.svs

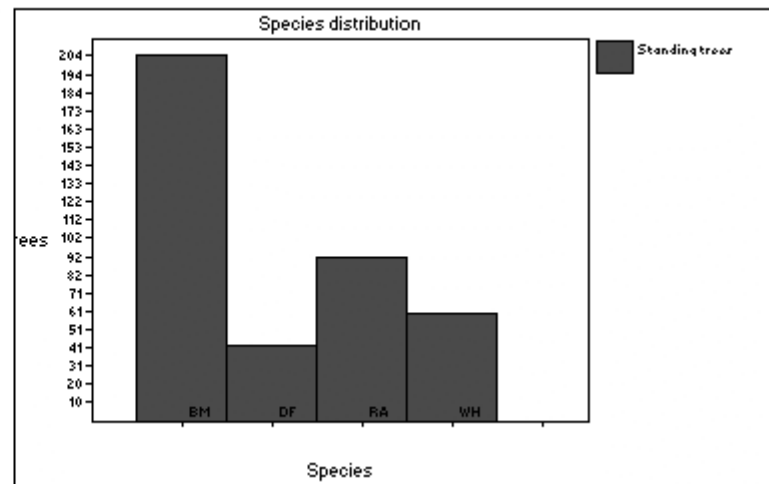
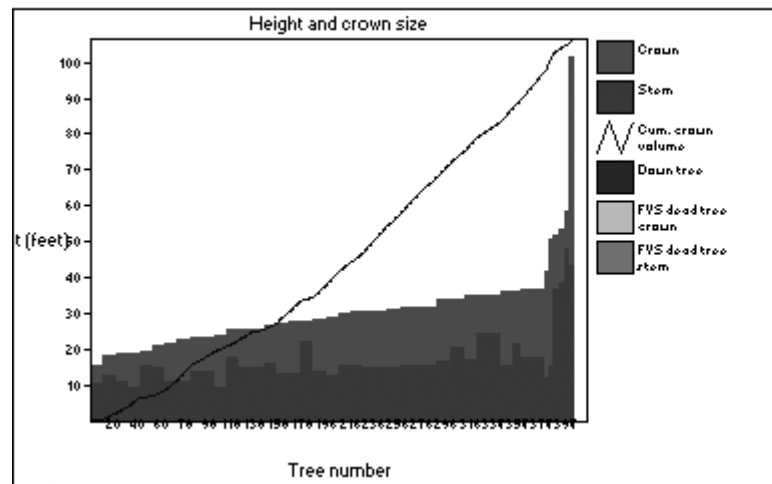
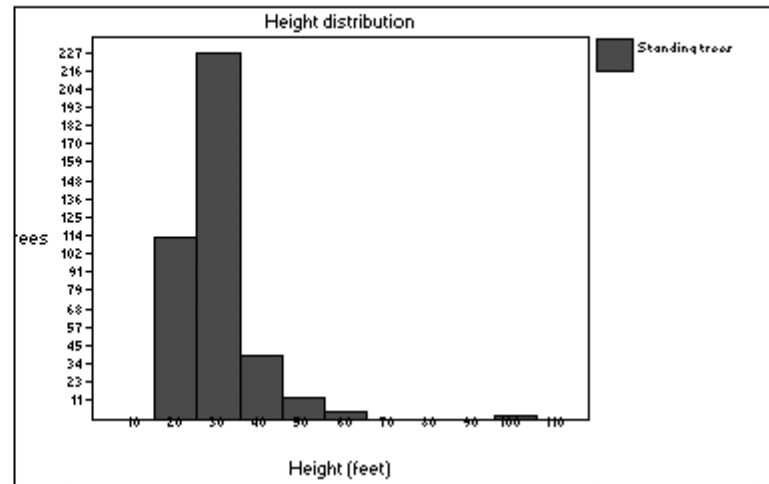
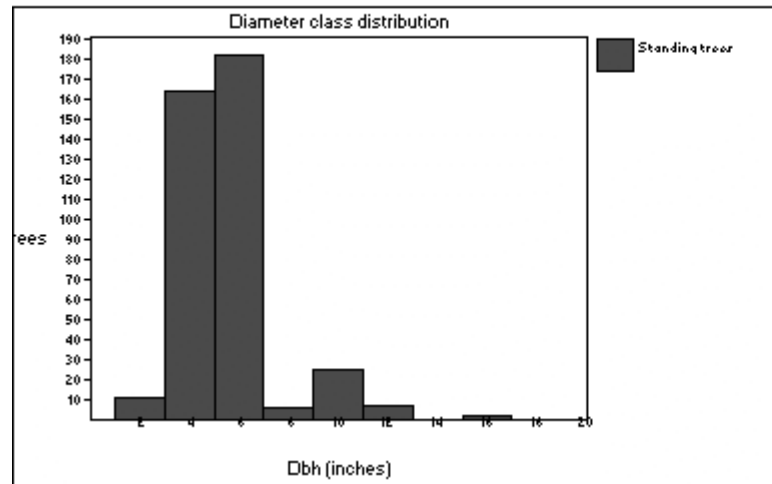


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Pre-commercially Thinned - 2008. Thin from below to 400TPA (canned scenario)

Stand1B - 2008

Stand1B-2008.svs



Pre-commercially Thinned - 2008.
Thin from below to 400TPA (canned scenario)

Stand1B - 2008

File: G:\Forestry\LMS\Sugarloaf91903\Cache\Stand1B-2008.svs

Summary is for all species

Tree list summary:

Origin: (0.0,0.0)

Size: 208.7 by 208.7 (1.00 acres)

Units: ENGLISH

Total objects: 401 (401 per acre)

Standing live trees (using FVS plant class codes):

	Mean	SD	Min	Max
dbh	5.5	1.9	2.7	16.1
ht	29.4	9.4	15.2	101.5

Basal area: 73.9 (73.9 per acre)

Number of trees: 397 (397 per acre)

Standing dead trees (using FVS plant class codes):

No FVS standing dead trees to summarize

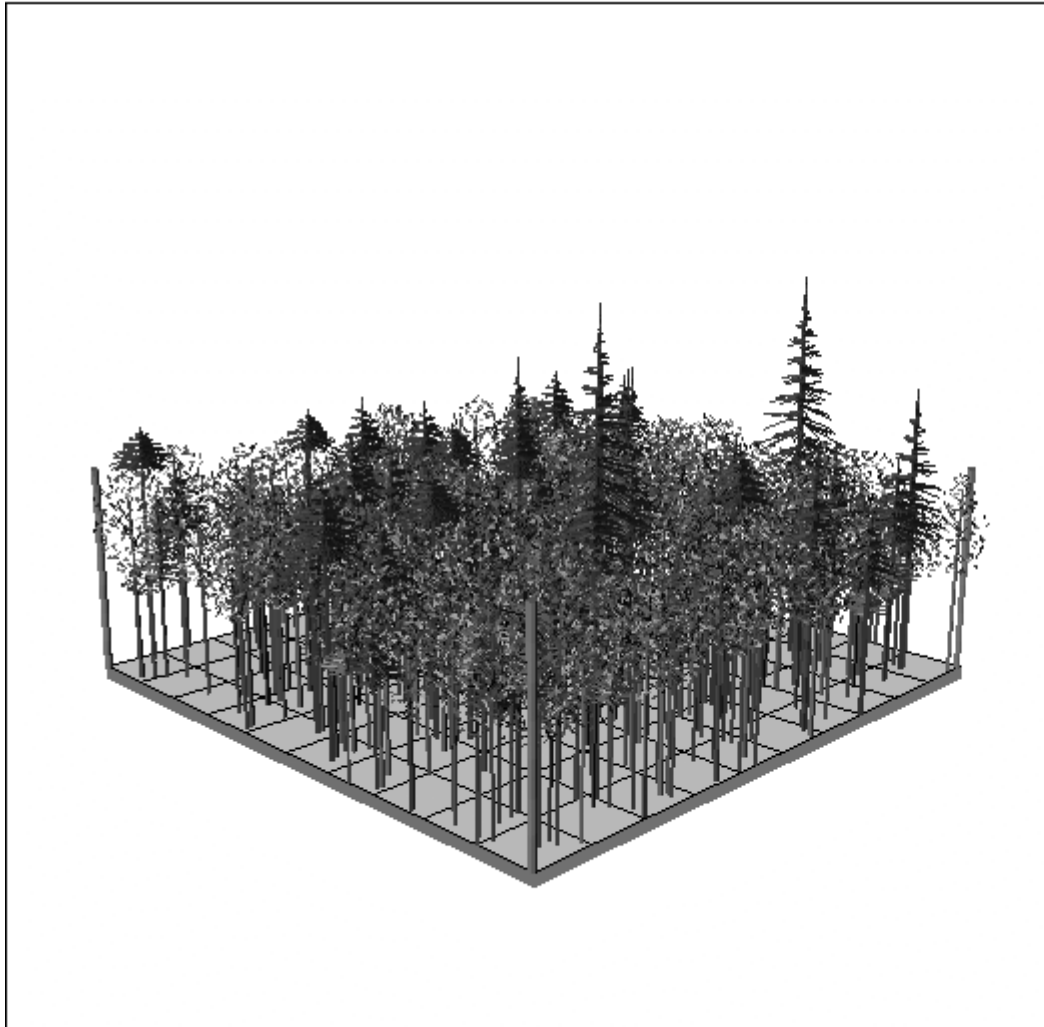
Downed trees and logs (status code 0, 10, 3, or 13):

No downed logs to summarize

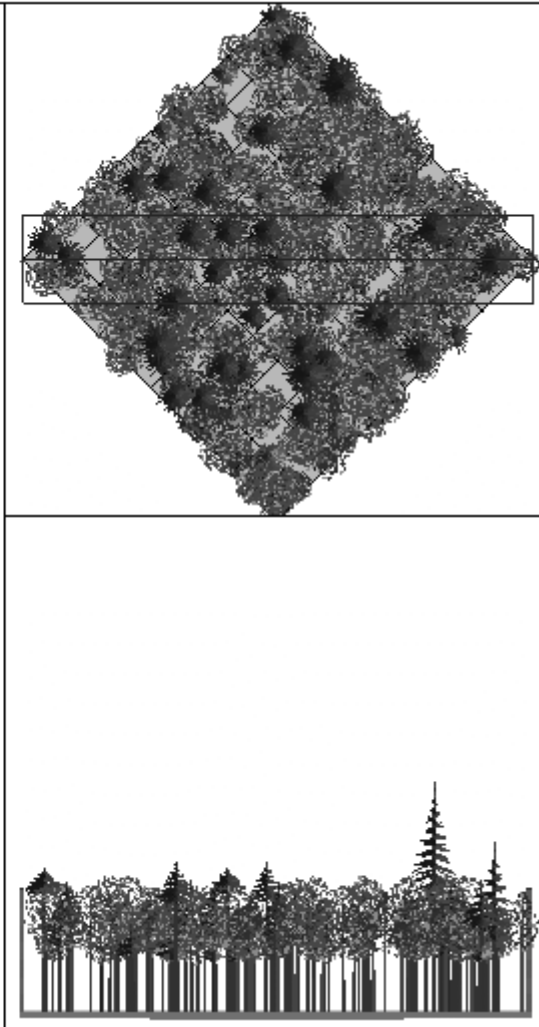
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Pre-commercially Thinned in 2008.
Grown untreated to 2028

Stand1B - 2028



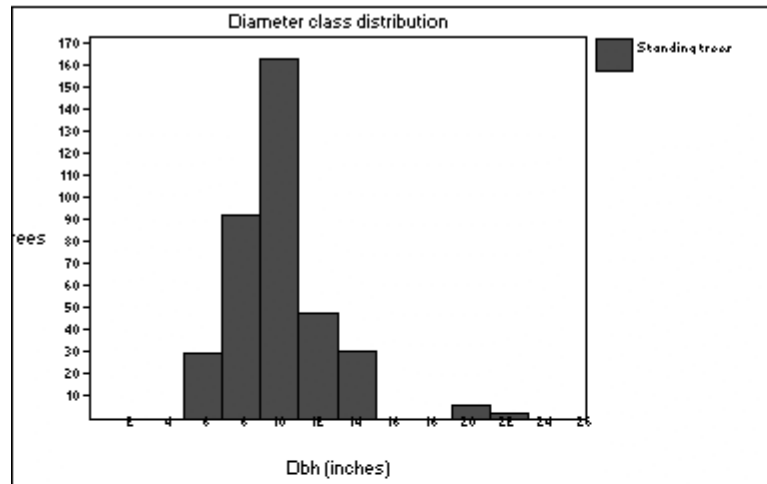
Stand1B-2028.svs



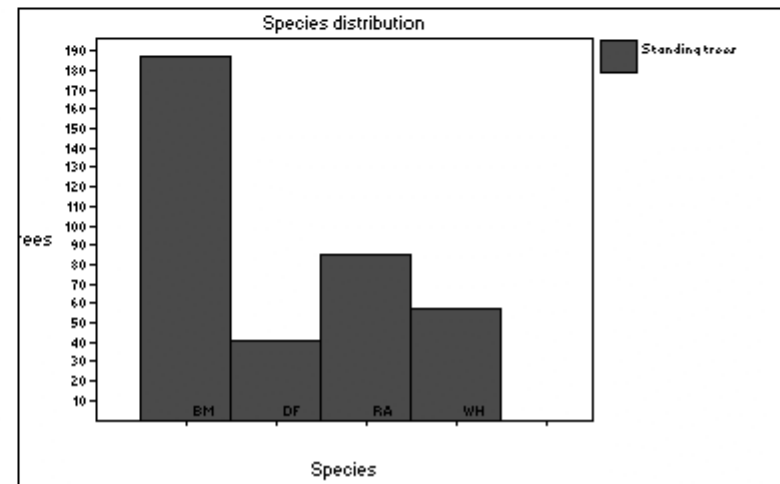
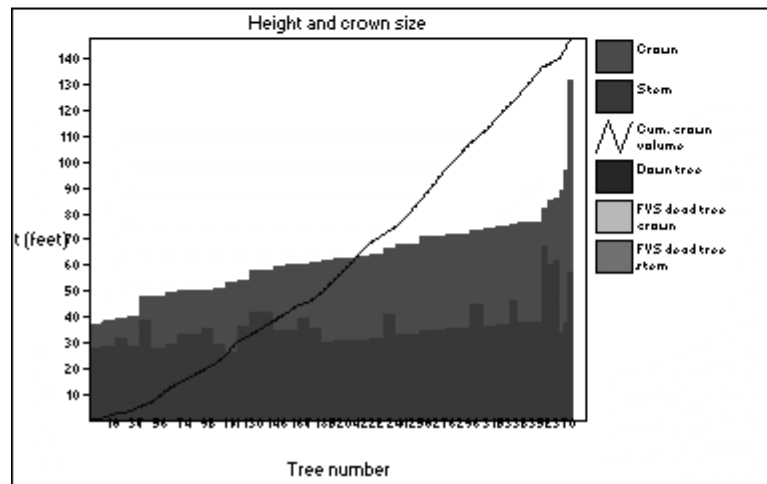
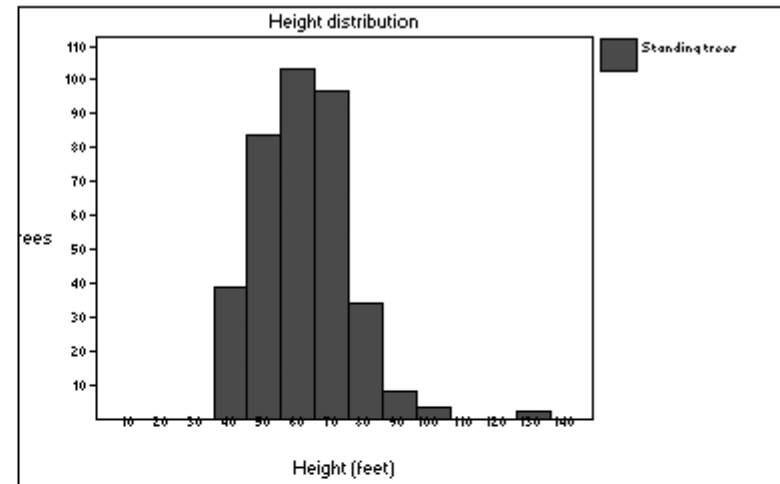
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Pre-commercially Thinned in 2008. Grown untreated to 2028

Stand1B - 2028



Stand1B-2028.svs



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Pre-commercially Thinned in 2008.
Grown untreated to 2028

Stand1B - 2028

File: G:\Forestry\LMS\Sugarloaf91903\Cache\Stand1B-2028.svs

Summary is for all species

Tree list summary:

Origin: (0.0,0.0)

Size: 208.7 by 208.7 (1.00 acres)

Units: ENGLISH

Total objects: 374 (374 per acre)

Standing live trees (using FVS plant class codes):

	Mean	SD	Min	Max
dbh	10.0	2.6	6.0	22.9
ht	61.7	13.9	36.6	131.6

Basal area: 215.0 (215.0 per acre)

Number of trees: 370 (370 per acre)

Standing dead trees (using FVS plant class codes):

No FVS standing dead trees to summarize

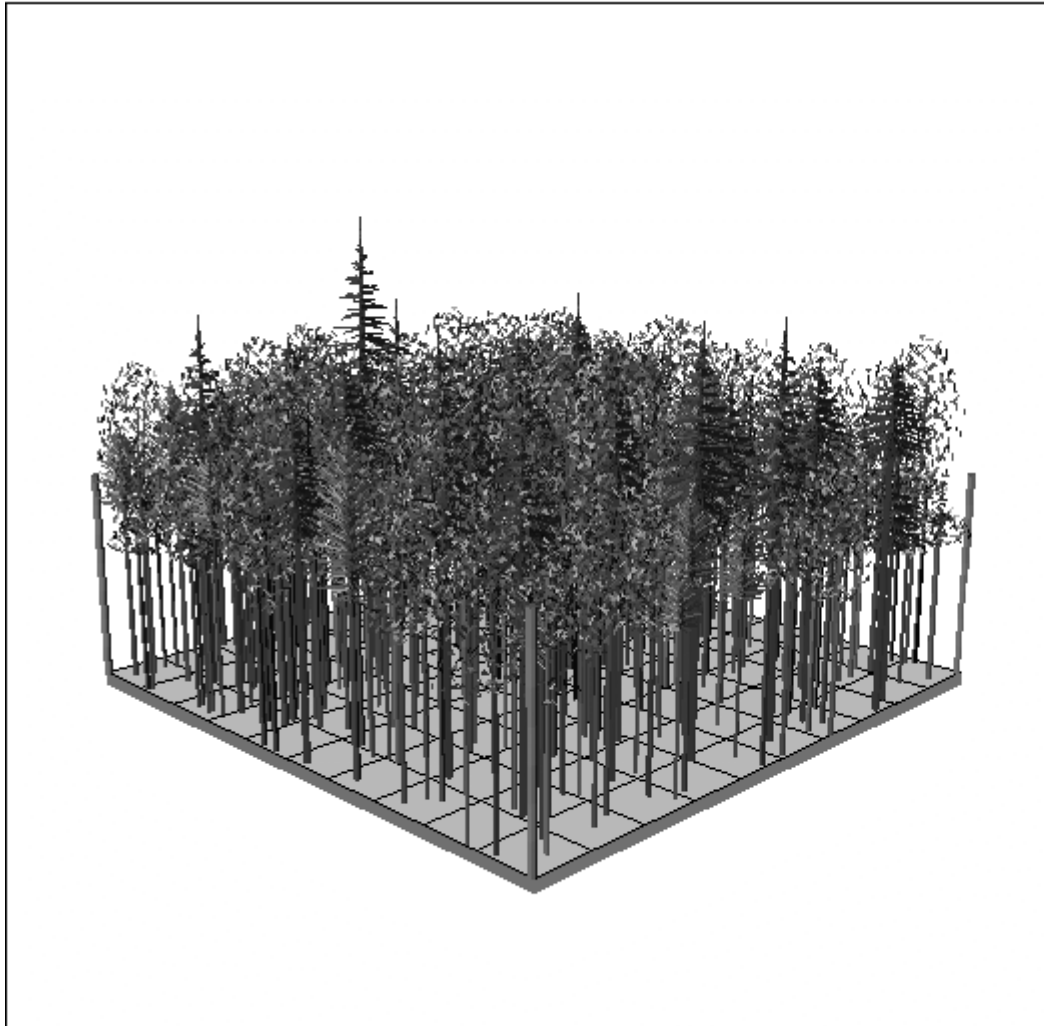
Downed trees and logs (status code 0, 10, 3, or 13):

No downed logs to summarize

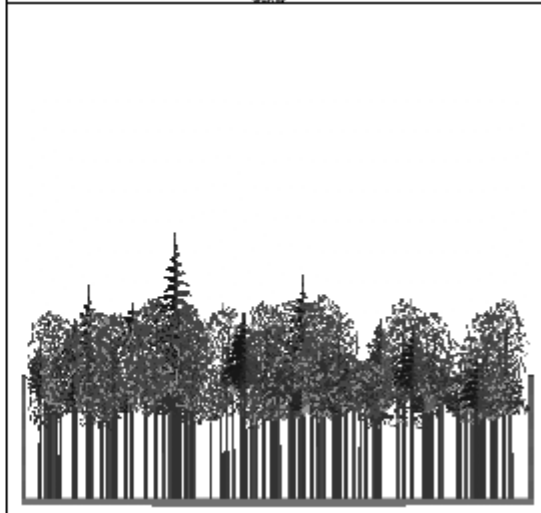
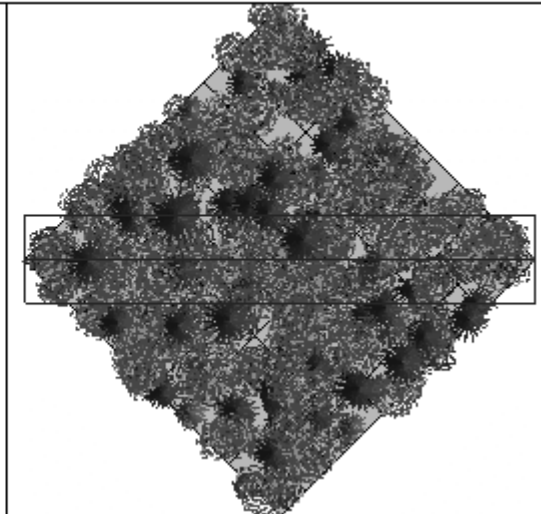
\\wlrnt5\RLOS\Forestry\LMS\Sugarloaf91903

Pre-commercially Thinned in 2008.
Grown untreated to 2048

Stand1B - 2048

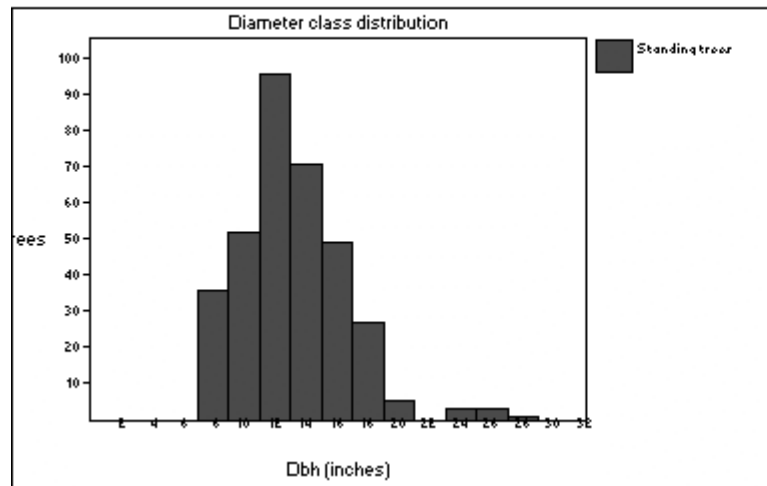


Stand1B-2048.svs

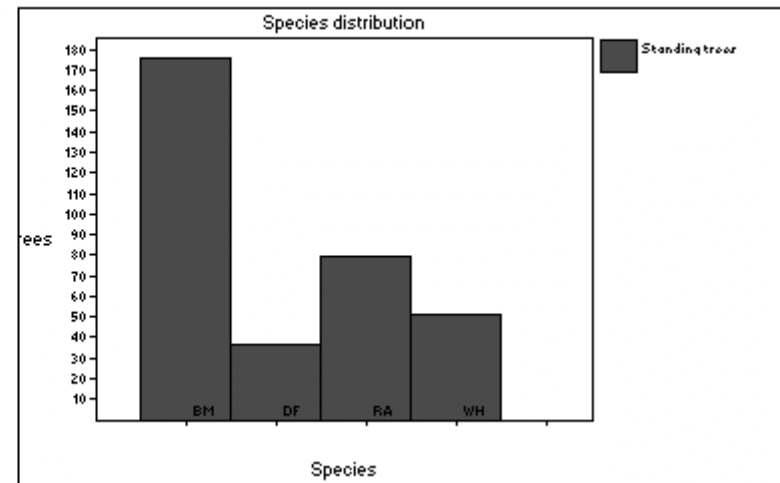
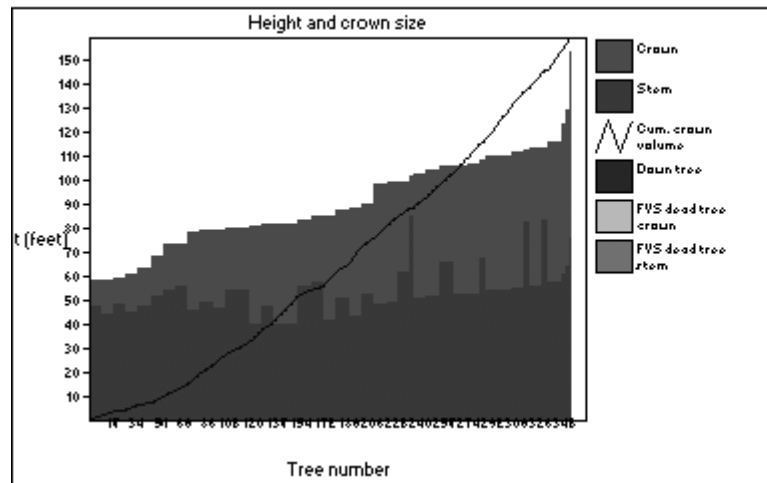
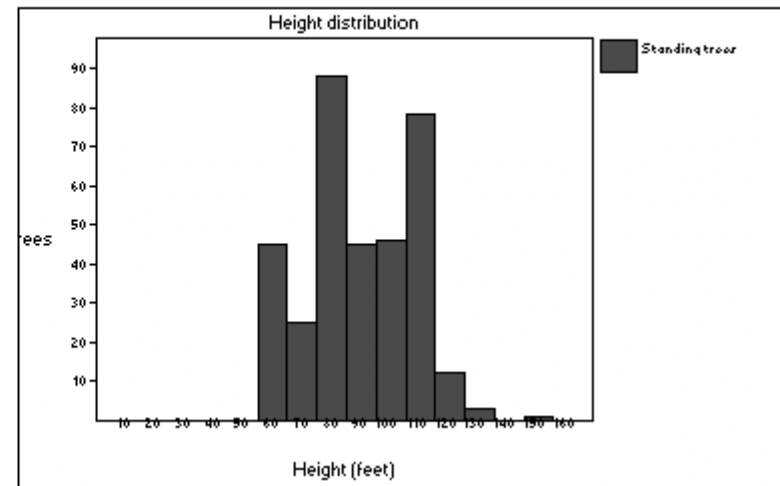


Pre-commercially Thinned in 2008. Grown untreated to 2048

Stand1B - 2048



Stand1B-2048.svs



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Pre-commercially Thinned in 2008. Grown untreated to 2048

Stand1B - 2048

File: G:\Forestry\LMS\Sugarloaf91903\Cache\Stand1B-2048.svs

Summary is for all species

Tree list summary:

Origin: (0.0,0.0)

Size: 208.7 by 208.7 (1.00 acres)

Units: ENGLISH

Total objects: 347 (347 per acre)

Standing live trees (using FVS plant class codes):

	Mean	SD	Min	Max
dbh	13.0	3.5	7.7	28.6
ht	89.1	17.9	58.1	153.0

Basal area: 337.1 (337.2 per acre)

Number of trees: 343 (343 per acre)

Standing dead trees (using FVS plant class codes):

No FVS standing dead trees to summarize

Downed trees and logs (status code 0, 10, 3, or 13):

No downed logs to summarize

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