Forest Habitat Assessment Report

PREPARED FOR:

Friends of Julia's Gulch
c/o Cascade Land Conservancy
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PROJECT:

Julia's Gulch
Tacoma, WA
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DATE

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Executive Summary

The findings and conclusions presented in this report are based on an interpretation of information currently available to AHBL. This summary is for introductory purposes and should be used only in conjunction with the full extent of this report.

The methods used for the completion of the forest inventory are in accordance with full forest stand delineation standards. The inventory was conducted using the variable radius plot point sampling method of inventory forest resources. Forest stands were delineated into a vegetative cover type with a size designation based upon the dominant/co-dominant tree species.

Based on the information derived through site reconnaissance and readily available documents three forest stands were identified on the subject property within approximately 31.66 acres of forest. The following table summarizes information related to the onsite forest stands.

Stand	Type	Size	Dominant Size Class	Health
Stand 1	Douglas Fir/Pacific Madrone	2.21 acres	3-24"	Fair
Stand 2	Red Alder/Big Leaf Maple	19.25 acres	6-20"	Poor
Stand 3	Douglas Fir/Big Leaf Maple	10.2 acres	14-29"	Good

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1.0 INTRODUCTION

During several site visits in September 2010 and March 2011, Theresa Dusek of AHBL, Inc. conducted a preliminary forest inventory within Julia's Gulch to complete a forest stand delineation and overall assessment of forest health. Julia's Gulch is located within the City of Tacoma, and is comprised of 3 parcels (0321253000, 0321253043, and 0321253042). The evaluation was conducted in accordance with basic forest conservation and delineation field study standards. The Restoration Report for Julia's Gulch completed by AHBL identified ten Restoration Areas A through J.

The scope of work conducted for this portion of the habitat assessment included a natural resources inventory, forest characterization, and the preparation of a Forest Report and detailed resource mapping. This report contains a description of each of the forest stand types encountered during the forest study. The Forest Stand Delineation (FSD) included three separate stands within the site, based on subtle differences in stand composition, soil type and moisture regime, forest structure and condition, noxious weed impacts, and human disturbance. Restoration Areas H and I were identified as Stand 1 Douglas Fir/Pacific Madrone, Restoration Areas A through F were identified as Stand 2 Alder/Big Leaf Maple, and Restoration Areas G and J were identified as Stand 3 Douglas Fir/Big Leaf Maple (Appendix A).

1.1 Scope of Services

The scope of services for this study was limited to the following tasks:

1. Evaluation of the forest ecology using scientific methods appropriate to the Puget Sound Area and Western Washington.

2. The preparation of a Forest Habitat Assessment Report.

1.2 Overview and History

Julia's Gulch was divided into 10 areas for restoration purposes based on vegetative cover, soils, slope, and slope aspect. These areas include:

Table 1: Restoration Areas and Conditions

ID #/Size	Existing Condition
Restoration Area A/ 37,237 sf (0.86 acres)	Flat area along Norpoint Way near View Point Park. Contained greater than 80% cover Himalayan blackberry and other noxious weeds and invasive species. Soils are sand to gravelly sand to gravelly sandy loam with pH of 6.1. Approximately 32,000 sf (0.74 acre) has been restored and is in the maintenance phase.
Restoration Area B/ 135,153 sf (3.1 acres)	Flat area along Norpoint Way starting near the historic site access. Contains approximately 80% cover Himalayan blackberry, a patch of Japanese knotweed and ivy and herb Robert. Soils are gravelly sandy loam with pH of 6.2. Soils at the historic access are compacted and contain some asphalt paving.
Restoration Area C/ 268,965 sf (6.2 acres)	East facing slope of the west ravine. Contains greater than 80% cover Himalayan blackberry and other non-native and invasive species. Soils are gravelly sandy loam with pH range of 6.0 to 6.2. Approximately 30,000 square feet of this area has been cleared of blackberries and was planted in December 2010.
Restoration Area D/ 20,257 sf (0.47 acres)	Slopes on the northwest corner of the site. Contains approximately 80% cover Himalayan blackberry, holly, ivy and other non-native and invasive species. Soils are gravelly sandy loam with pH of 6.2.

Restoration Area E/ 289,883 sf (6.7 acres)	Base of the main ravine north of the historic access road. Contains two patches of blackberry with approximately 30% cover. The blackberry patches were flagged with pink pin flags and estimated size to be 8,000 square feet per patch. The western boundary near the toe of slope contains 50% cover of blackberry for a width of 50 to 100 feet. Minor (less than 1%) scattered presence of ivy, holly and herb Robert. Japanese knotweed in this area has been sprayed. Soils are clay to clay loam and have a pH of 5.8 to 6.0.
Restoration Area F/ 72,838 sf (1.7 acres)	Base of the main ravine south of the historic access road. Contains scattered patches of dense Himalayan blackberry and minor ivy and herb Robert. Estimate 30% of Area F will need restoration. Soils are clay loam to gravelly sandy loam and have a pH of 6.5.
Restoration Area G/ 282,890 sf (6.5 acres)	West facing slope of main ravine. Contains less than 10% cover of scattered Himalayan blackberry and other non-native and invasive species. Holly on this slope has already been removed. Soils are gravelly sandy loam and have a pH of 5.8 to 6.0.
Restoration Area H/ 82,523 sf (1.9 acres)	Historically cleared areas at the top of the ridge between the two ravines. Contains approximately 20% cover Himalayan blackberry at the edges of the clearing and 30% cover of scotch broom throughout the clearing. Cottonwood trees are also encroaching on the Fir/Madrone plant community. Soils are sand to gravelly sandy loam and have a pH of 5.0.
Restoration Area I/ 13,520 sf (0.3 acres)	Flat compacted fill area along the south property line. Contains weedy herbaceous species, blackberry and scotch broom and compacted soils in an area less than 5,000 square feet (100 by 50 feet). Soils that are not heavily compacted are sand and sandy loam with a pH of 5.0. Concrete slab near the southeast corner.
Restoration Area J/ 161,850 sf (3.7 acres)	East ravine and slopes. Contains two small patches of holly trees and saplings totaling approximately 200 square feet. Very minor blackberry and ivy present on the slopes. Soils are gravelly sandy loam with pH of 6.0 to 6.2.

The proposed project site is comprised of 3 parcels (0321253000, 0321253043 and 0321253042) totaling 31.66 acres, located east of Norpoint Way NE in Section 25, Township 21, Range 03, W.M. in Tacoma, Pierce County, Washington (Appendix B). The site includes two ravines with steep slopes that have been highly disturbed by past filling and use of the main ravine (Julia's Gulch) for gravel mine settling ponds. The eastern gulch located on the site is known by the City as Metal Gulch. Based on review of the City of Tacoma govMe maps the site does not contain easements or utilities (sanitary sewer, storm sewer, waterlines, overhead and underground power, communication lines) that would limit restoration efforts. Soils in the enhancement areas are predominantly sand and gravelly sandy loam on the slopes and clay or silt loam in the base of the gulches. Vegetation includes well developed forest overstory with the understory dominated by either native plant communities or non-native plant communities including blackberry, ivy or knotweed. The south central portion of the site contains a cleared compacted gravel lot with a concrete pad. The gravel area contains weed species and a few tree saplings. Vegetation planted in this area by Friends of Julia's Gulch does not have a high survival rate due likely to compacted soils and high soil pH. Streams and wetlands were not observed on the site. A seasonal stream in the east gulch has been mentioned by several individuals from the City of Tacoma; however, no channel, bed or bank was observed in this gulch during the site visits. Runoff from the site ultimately enters a tidal ditch located 610 feet south of the site on the north side of Marine View Drive and then flows into the Hylebos Waterway located approximately 710 feet from the site. The Hylebos Waterway has fish use including Fall Chinook, Coho, Fall Chum, Pink Salmon, and Winter Steelhead. The site is located in the Puyallup/White Basin Water Resource Inventory Area 10.

The subject property is bordered immediately to the north by undeveloped land, and single-family housing; to the south by Marine View Park and commercial and industrial businesses; to the west by Norpoint Way NE, single-family housing and undeveloped land; and to the east by undeveloped land and single-family housing

AHBL was requested to complete a Restoration Report and Plan, and a forest health study discussed in this report.

2.0 FOREST ANALYSIS

2.1 Methods

The methods used for the completion of the forest inventory are in accordance with full forest stand delineation standards. The inventory was conducted using the variable radius plot point sampling method of inventory forest resources. Sample plots were randomly located throughout the property using preliminary maps to ensure unbiased but complete representation of the stands.

At each sample plot, a ten (10) basal area factor (BAF) wedge prism was used to determine countable trees. All countable trees 2 inches DBH or greater, and greater than 20 feet in height were tallied. The individual diameter of each tree was measured and tallied. Standard protocol was used to measure DBH using a foresters cruising tree stick located 25 inches from the eye at 4.5 feet from the ground level at the uphill side of the tree. DBH can be an indicator of tree age, and obtaining measurements across a stand can give a relative estimate of stand age, regeneration, and diversity.

Additionally, any standing, dead, countable tree greater than 6 inches DBH was also tallied. At each sample point, the overall percentage of canopy closure (trees greater than 20 feet tall), understory canopy aerial coverage (trees and shrubs 3 to 20 feet tall), and herbaceous layer ground cover (woody and herbaceous plants 0 to 3 feet tall) were estimated and recorded. Canopy closure is a visual estimate of the entire plot area, and is an indication of general light levels in the understory and stand maturity. Bare ground percent cover can be estimated by the percent cover of herbaceous species.

Also recorded at each sample plot were (a) common names of all identifiable shrubs and herbs, (b) canopy position of each tree, (c) observation of saplings regenerating, (d) presence of invasive species and their overall percent cover, (d) notation of the presence of large downed woody debris, (e) presence of disturbance, and (f) general condition of the sample point surroundings.

The location of each plot was flagged in the field with orange survey ribbon labeled "FSD" with the corresponding plot number. Data sheets are provided in Appendix B and, in addition to the data described above, each data sheet contains the site name, plot number, date recorded, and the recorders name.

Forest stands were delineated into a vegetative cover type with a size designation based upon the dominant/co-dominant tree species. Note that forests frequently include a mix of several species in various height distribution layers. Any individual tree species or group of similar species (such as "mixed conifers," which could include Douglas fir, Sitka spruce, western red cedar, and western hemlock) may be represented within a stand type, but also could be not dominant/co-dominant, not prevalent (predominant), or both.

A stand is a contiguous area where the species, size, age, and general condition of trees is uniform enough to be distinguished from adjacent areas. The map that accompanies this report shows the layout of the property and the various restoration areas. Restoration Areas H and I were identified as Stand 1 Douglas Fir/Pacific Madrone, Restoration Areas A through F were identified as Stand 2 Alder/Big Leaf Maple, and Restoration Areas G and J were identified as Stand 3 Douglas Fir/Big Leaf Maple (Appendix A).

2.2 Stand Characterization

Stand health rankings are provided as follows: poor, fair, good, and excellent.

- Poor: young, dominated by invasive species, and highly disturbed. Extensive enhancement recommended.
- Fair: moderately developed and with large patches of invasive species, with or without human disturbance. Moderate enhancement recommended.
- Good: moderately to well developed and low invasive cover, but with presence of daily human disturbance. Little or no enhancement recommended.
- Excellent: mature, low invasive cover, and minimal human disturbance. No habitat enhancement recommended.

Stocking, or stand density, is a term used to describe how well the trees in a stand utilize the available space. In classifying the stocking of a stand, the following terms will be used.

- Well-stocked: a stand in which the trees are well distributed and all the space is utilized, but the trees still have room for continued growth.
- Understocked: a stand in which there are large open spaces between the trees.
- Overstocked: a stand that is so overcrowded that trees grow very slowly, or have poor form due to heavy competition.

2.3 Results

Three distinct forest stands were identified onsite. The onsite stands are dominated by fir and western hardwoods. Dominant western hardwoods onsite include big leaf maple, red alder, and Madrone.

In general, the forest cover in the eastern ravine and west facing slope of the main ravine (Stand 3) are well developed, have recruitment of young trees, and include well developed canopy cover and subcanopy layers. However, the forest cover on the central section of the site (Stands 1 and 2) is young, highly disturbed, and dominated by invasive species. The south central portion of Restoration Area E in Stand 2 contains a regenerating alder forest in the very base of the ravine with a well developed understory. A detailed description of each stand is provided below, and stand summary sheets are provided in Appendix C. A species list of all plants listed below and all plants observed onsite is provided in Appendix D.

Table 2. Forest Stand Summary				
Stand	**Type**	**Size**	**Dominant Size Class**	**Health**
Stand 1	Douglas Fir/Pacific Madrone	2.21 acres	3-24"	Fair
Stand 2	Red Alder/Big Leaf Maple	19.25 acres	6-20"	Poor
Stand 3	Douglas Fir/Big Leaf Maple	10.2 acres	14-29"	Good

2.3.1 Forest Stand 1

Forest Cover Type: Mixed Fir/Western Hardwood Forest - Douglas Fir/Pacific Madrone
Acreage: 2.21 acres

This stand's overstory is dominated by Douglas fir and Madrone. The stand also contains small populations of western hemlock, and bitter cherry. The understory and herbaceous layers of the stand contain a variety of species including Madrone saplings, oceanspray, goldenrod, western fescue, bentgrass, Mullen, clover, mosses and lichen. Topography of the stand is flat in the south and is a ridge sloping down to the south. Raptors and mourning doves were observed to frequent this stand on a regular basis.

Forest Sample Plot 1 and 2 are located within the stand. Forest Stand 1 has an average DBH of 11 inches, an average basal area of 45 square feet per acre, and contains an average of 210 trees per acre greater than 2 inches DBH. The dominant size class for the stand is 3 to 24 inches. The stand contains an average canopy closure of 20 percent, subcanopy closure of 20 percent, and herbaceous cover of 50 percent. Noxious weeds were located within the sample plot, including scotch broom and Himalayan blackberry. No snags greater than 6 inches DBH were located within the sample plot, and no downed large woody debris was present.

Stand 1 is visible in aerial photographs and the photographs show that the southern portion of the stand was disturbed by clearing, grading and filling starting in the 1950s. The 1931 and 1941 photograph shows an intact Madrone/Douglas fir forest. In the 1990 aerial photograph significant grading occurred in Stand 1 with a few scattered trees remaining on the edges of the stand, and the 2002 shows buildings on the southern portion of Stand 1. Since 2002 significant modifications to Stand 1 are not apparent on the aerial photographs, placing its age at 9 years old with a few trees older than 60 years. The stand includes a concrete pad near the southeast corner. Bordering the stand to the south are industrial uses.

2.3.2 Forest Stand 2

Forest Cover Type: Western Hardwood - Red Alder/Big Leaf Maple
Acreage: 19.25 acres

The stand's overstory is dominated by red alder and big leaf maple, but also contains black cottonwood, mature Madrone, western hemlock, black locus, mountain ash, western red cedar, horse chestnut and a single occurrence of pacific willow. The understory layers include big leaf maple saplings, cedar saplings, alder saplings, vine maple, fir saplings, yew, snowberry, thimbleberry, black cap raspberry, Indian plum, red elderberry, hazelnut, oceanspray, evergreen huckleberry, salmonberry, knotweed, and Himalayan and evergreen blackberry. A small patch of red osier dogwood is present in the central portion of Restoration Area F. Herbaceous layers include sword fern, bracken fern, lady fern, dewberry, ivy, Oregon grape, fireweed, false Solomon's

seal, glyceria, large leaf avens, and herb Robert. The topography of the stand contains the east facing slope of the main ravine and base of the main ravine. The stand is flat near Marine View Drive and steeply slopes downward toward the east and includes the base of the ravine that gently slopes to the south and contains two berms with dirt roads. Restoration Areas A through F are located within this stand.

Forest Sample Plots 3 through 6 are located within this stand. Forest Stand 2 has an average DBH of 11.6 inches, an average basal area of 112.5 square feet per acre, and contains an average of 350 trees per acre greater than 2 inches DBH. The dominant size class of the stand is 6 to 20 inches. The stand contains an average canopy closure of 72.5 percent, a subcanopy closure of 52.5 percent, and herbaceous cover of 27.5 percent. Within the subcanopy and herbaceous species, approximately 80 percent of the cover is comprised of invasive species in Data Point 6 due to the presence of ivy and blackberry. Herb Robert is also scattered throughout the stand. Two untreated occurrences of knotweed are located within the stand and are noted on the site map. Four snags greater than 6 inches DBH were located within Forest Sample Plot 5 and 6 and large woody debris is located throughout northern portion of the stand.

A review of historical areas photographs reveals that in 1931 the western edge of the stand was graded and cleared, likely due to road construction. In addition, the central portion of the stand in and east-west direction appears to have been logged. The 1950 aerial photograph shows significant grading and a north-south road in the base of the ravine. By 1973 only the southwest and west central portion of the stand are cleared. Trees have regenerated in the remainder of the stand. By 1990 significant alterations occurred to the stand including placement of the dirt road along the south site boundary and the east-west dirt road through the central portion of the stand. Sediment ponds for the nearby gravel mining operation were onsite. In the aerial photos between 1990 and 2002 the central portion of the site regenerated trees and was cleared several times. In the 2005 photograph the west central gravel area appear to have been paved. The 2006 and 2009 aerial photographs show the site in a similar condition to today. It is estimated that the stand is approximately 20 to 30 years old in the base and east facing slope of the ravine and between 30 to 75 years old on the west facing slope since portion of this area were cleared and other portions were not. The stand includes two remaining east-west dirt roads and the parking area near the west central portion of the stand.

2.3.3 Forest Stand 3

Forest Cover Type: Mixed Fir/Western Hardwood Forest - Douglas Fir/Big Leaf Maple
Acreage: 10.2 acres

The stand's overstory is dominated by Douglas fir and big leaf maple, though it also contains Madrone, black cottonwood and alder. The understory is comprised of fir saplings, alder saplings, vine maple, Indian plum, red elderberry, thimbleberry, red raspberry, hazelnut, salmonberry, sword fern, salal, snowberry, Oregon grape, oceanspray, trailing blackberry, and big leaf maple saplings. Herbaceous layers include sword fern, bracken fern, lady fern, salal, dewberry, Oregon grape, glyceria, large leaf avens. The topography of the eastern portion of the stand is a ravine (in the past known as Metal Gulch) with east and west facing slopes into the base of the ravine that gently slopes to the south. The west portion of the stand is a west facing slope into Julia's Gulch. A red tail hawk nest is located east offsite. Pileated woodpeckers are using snags for foraging and snags in the center of Restoration Area J may be used

for nesting. Review of this area during the spring would substantiate the presence of absence of nesting pileated woodpeckers.

Forest Sample Plots 7, 8 and 9 are located within this stand. Forest Stand 3 has an average DBH of 18.2, an average basal area of 110 square feet per acre, and an average of 79 trees per acre greater than 2 inches DBH. The dominant size class for the stand is 14 to 29 inches. The stand contains an average canopy closure of 63 percent, a subcanopy closure of 60 percent, and herbaceous cover of 50 percent. Of the subcanopy and herbaceous cover, less than 5 percent cover is attributed to invasive species, with the exception of the southwest portion of the stand between Restoration Areas F and H (Plot 9) where there is a 60 percent cover of blackberry, ivy and herb Robert. Four large snags and multiple large downed logs were located within the sample plots. Snags being used by Pileated woodpeckers for foraging and potentially nesting are located in the center of the ravine.

Between 1990 and 1998 aerial photographs of this stand show a portion of the stand was cleared, likely where the roads were constructed (on the east facing slope of the east ravine and the west facing slope of the west ravine) otherwise the site appears to be forested back to 1931. This places the forest stand in the approximate age range of 20 to 80 years. The stand includes an old dirt road which currently serves as a foot path in Restoration Area J and in the southwest portion of Restoration Area G. The old road and area adjacent to Restoration Area H is the youngest portion of the stand. Stand 3 is bordered by forested areas with residential developed beyond the forest to the east.

2.4 Recommendations for Management and Habitat Restoration

2.4.1 General Forest Recommendations

Forest Cover on the site should be protected from alterations to the site by trails, access and parking areas. Development of a trail system should use existing paths and areas covered with noxious weeds that are proposed to be removed. Native trees and subcanopy should remain intact. The following should also be taken into consideration when planning proposed projects or undertaking management activities:

- Minimize forest isolation. Generally, forests that are adjacent, close to, or connected to other forests provide higher quality habitat than more isolated forests.
- Maintain forest canopy closure over trails, accesses and parking areas when possible.
- Maintain forest habitat up to the edge of roads and driveways; do not create grassy edges along trails and paths. For safety maintain the areas adjacent to trails and paths, accesses and parking areas with forest canopy and low growing (less than 3 foot tall) native plant species.
- Remove invasive and non-native species, especially English ivy, holly, herb Robert, knotweed and Himalayan blackberry.
- Do not mow the forest understory.
- Retain decaying and dead trees, and woody debris.

- Maintain the two ravines onsite as wildlife corridors.
- Minimize impervious area by removing paved areas not proposed to be used in the future.

2.4.2 Stand 1

Stand 1 is in fair condition, with young Madrone trees and a few mature Douglas fir trees and a small portion of the stand which has been impacted and contains no trees. The edges contain blackberry and the main portion of the stand contains Scotch broom. The lower portion of the stand has been cleared and soils have been compacted. It is recommended that the compacted soils be decompacted, have topsoil or compost added and be replanted with Madrone habitat. A concrete pad located in the southeast corner of the stand if not proposed to be used in the future should be removed and the area be planted with native understory species typical of the stand. Finally, blackberry along the edge of the stand and Scot's broom within the stand should be removed and monitored to prevent growth.

There are no set stocking standards for madrone stands and, as such, no recommendations can be given regarding appropriate stand density. The United States Department of Agriculture Natural Resource Conservation Service Plants Database (USDA) indicates that Madrone stands typically contain densities of 170 to 300 trees per acre and Douglas fir stands typically have between 300 and 1,200 trees per acre depending on the diameter of the trees. Overall a density of 210 trees per acre in Stand 1 which is mostly Madrone meets the USDA densities.

2.4.3 Stand 2

Stand 2 is in relatively poor health and contains a large presence of invasive species within the herbaceous and shrub layers. Ideally, ivy should be removed from both the ground cover and the tree trunks, and the area should be replanted with native understory species. Additionally, large areas of blackberry and other noxious weeds in the understory should be removed and replaced with native species.

This stand is dominated by red alder and big leaf maple mixed with other short- lived hardwoods such as black cottonwood. The stand contains some conifer saplings throughout the stand and a few mature conifers and Madrone on the west facing slope. The central portion of the stand in the central base of the ravine contains a young alder forest with a few western red cedar saplings. According to the Oregon State University Extension Service's "Woodland Workbook, Managing Red Alders," Stand 2 is stocked appropriately. According to the workbook, red alder stands with an average DBH of 11 inches should have a target density around 190 trees per acre. The red alder portion of Stand 2 has an average DBH of approximately 11 inches and an average density of 183 trees per acre. This stand is slightly under stocked. Due to red alder being a pioneer species that came in on the site in an area that was more recently disturbed and that these stands are typically short lived, less than 100 years it is recommended that this stand be under-planted with conifer species. The maple portion of the stand should also be under-planted with conifers to diversify the stand.

Conifer under-planting includes the removal of existing understory shrubs within 4 feet or wider of each planting spot, and the planting of large saplings of shade-tolerant conifers. Species of conifers are chosen based upon the aspect of slopes on which the stand may be located, and presence of hydrology. Appropriate species for this stand,

which is located off the slopes would be western red cedar, western hemlock, Sitka spruce and pacific yew. On the slopes would be Douglas fir, western hemlock and grand fir. The intent of under-planting is that, when the alders and maple follow natural succession and begin to decline, the conifers will respond to increased light availability with vigorous growth (WSU Manual EM003).

2.4.4 Stand 3

Stand C is in relatively good health, with a mixture of mature and young trees of varying species. The only large area of invasive species is in the southwest corner of the stand, though several small areas do exist, as well as single, non-native trees and shrubs. It is recommended that non-native shrubs including holly and laurel be removed, and that any other invasive species be controlled and monitored. Native tree and shrub species should be planted in the southwest corner of the stand after removal of invasive species. Douglas fir, western hemlock and grand fir would be appropriate conifers to plant.

According to the Oregon State University Extension Service, this stand would be considered to be appropriately stocked with 79 trees per acre with an average DBH of 18. More than 125 trees per acre would be considered overstocked and less than 60 trees per acre would be considered under stocked.

3.0 CONCLUSION

The overall health of the forest at Julia's Gulch is in good condition in the eastern section of the property, which contains Stand 3, poor in Stand 2 and fair in Stand 1. Stand 3 has high tree species diversity, sapling recruitment, little invasive species cover and is currently being used for pileated woodpecker foraging and potentially nesting habitat. The southwest portion of Stand 3 in Restoration Area G (between Area F and H) could greatly improve beyond its current condition through the removal of invasive species and planting of native tree, shrub and herbaceous species. Stand 2 has extensive invasive species in the understory, poor understory development and low natural recruitment of native tree species. With invasive species removal and enhancement with native evergreen trees and native shrubs, the habitat within Stand 2 could greatly improve over time beyond current conditions. Stand 1 although graded in the past has a few mature Douglas fir trees, mature and young Madrone trees and an excellent understory of native grasses, moss and lichens in Restoration Area H. Stand 1 has been highly impacted with compacted soils in Restoration Area I. In Restoration Area H removal of blackberry near the edges of this stand and scotch broom throughout and planting of native tree and shrub species would be ideal. Cautions should taken to retain the herbaceous layer of native grasses, mosses and lichens. Alternatively, Restoration Area I in Stand 1 have been historically degraded through clearing and grading and contain compacted soils. Large-scale rehabilitation of this area would be ideal, with goals focused on removal of invasive species, decompaction of soils, restoring Madrone habitat, and providing a visual barrier to the south.

4.0 CLOSURE

The findings and conclusions documented in this report have been prepared for specific application to this site. They have been developed in a manner consistent with that level of care and skill normally exercised by members of the environmental science profession currently practicing under similar conditions in the area. Our work was also performed in accordance with the terms and conditions set forth in our proposal. The conclusions and recommendations presented in this report are professional opinions based on an interpretation of information

currently available to us, and are made within the operation scope, budget, and schedule of this project. No warranty, expressed or implied, is made.

AHBL, Inc.

Theresa R. Dusek
Natural Resources Ecologist Project Manager

TS/lsk

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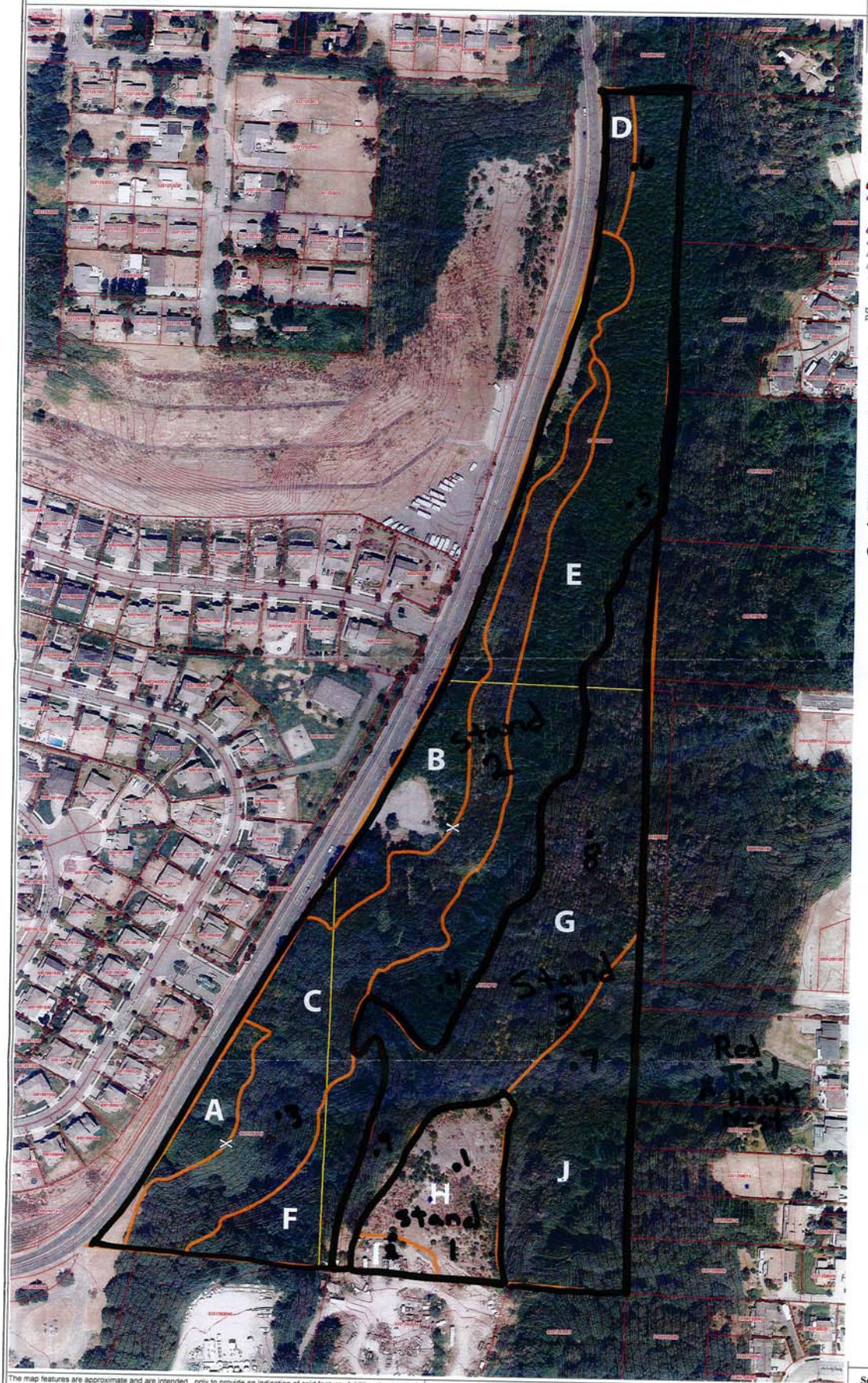
Appendix A

Julia's Gulch Map

Project Title: Julia's Gulch

Issue Set /Date: November 12, 2010

Job No: 210260.70



Map Legend

- Highlighted Tax Parcels
- Tax Parcels
- Contours - Cities
- Intermediate Contour
- Index Contour
- Roads
- Interstate
- Limited Access State Routes
- Other State Routes
- Ramps
- Major Arterial
- Collector
- Local Access
- County - 2008 - Ortho
- Knotweed

Area Calculations:

A	=	37,237 SF
B	=	135,153 SF
C	=	268,965 SF
D	=	20,257 SF
E	=	289,883 SF
F	=	72,838 SF
G	=	282,890 SF
H	=	82,523 SF
I	=	13,520 SF
J	=	161,850 SF

(Areas are approximate)

● 1: Forest sample plot location

Scale 1:1,200

0 50 100 ft.

Printed: 11/12/10 9:28 AM

Appendix B

Forest Sample Plot Data Sheets

Forest Sample Plot Field Data Sheet

Property: Julia's Gulch Prepared by: T. Dusek

Stand #: 1 Plot#: 1 Plot Size: (BAF) 10 Date: _____

Basal Area in sf/acre:	Size Class of Trees within sample plot															
Tree Species	# of Trees 2-5.9" dbh			#of Trees 6-9.9" dbh			# of Trees 10-17.9"dbh			# of Trees 18-29.9" dbh			# of Trees > 30" dbh			Total
Crown Position	DOM	COD	OTH	DOM	COD	OTH	DOM	COD	OTH	DOM	COD	OTH	DOM	COD	OTH	
Douglas fir	3									24						2
Madrone							12,10 12,10									4
Total Number of Trees per Size Class	1			0			4			1			0			6
Number of standing dead trees 6" dbh or greater	0			0			0			0			0			0

1/100 Ac. Samples:

List of Common Understory Species 3'-20'	% Canopy Coverage						% Invasive Cover					
madrone saplings oceanspray	C	N	E	S	W	Total 30	C	N	E	S	W	Total 20
List of Herbaceous Species 0'-3'	% Understory Cover 3'-20'						% Herbaceous/ Woody Cover 0'-3'					
goldenrod agrostis sp? western fescue fringecup mosses lichens	C	N	E	S	W	Total 20	C	N	E	S	W	Total 50
List of Invasive Species							Plot Successional Stage:					
Scotch broom							Early					

Comments:

Total number of tree species>6": 1 understocked

sheet 1 of 9

Forest Sample Plot Field Data Sheet

Property: Julia's Gulch Prepared by: T. Dusek

Stand #: 1 Plot#: 2 Plot Size: (BAF) 10 Date: _____

Basal Area in sf/acre:	Size Class of Trees within sample plot															
Tree Species	# of Trees 2-5.9" dbh			#of Trees 6-9.9" dbh			# of Trees 10-17.9"dbh			# of Trees 18-29.9" dbh			# of Trees > 30" dbh			Total
Crown Position	DOM	COD	OTH	DOM	COD	OTH	DOM	COD	OTH	DOM	COD	OTH	DOM	COD	OTH	
Madrone	5 5	-														2
Co Hardwood												20				1
Total Number of Trees per Size Class	2			0			0			1			0			3
Number of standing dead trees 6" dbh or greater	0			0			0			0			0			0

1/100 Ac. Samples:

List of Common Understory Species 3'-20'	% Canopy Coverage						% Invasive Cover					
alder saplings	C	N	E	S	W	Total 10	C	N	E	S	W	Total 30
List of Herbaceous Species 0'-3'	**% Understory Cover 3'-20'**						**% Herbaceous/ Woody Cover 0'-3'**					
agrostis sp, mullen clover moss lichen	C	N	E	S	W	Total 20	C	N	E	S	W	Total 50
List of Invasive Species							**Plot Successional Stage:**					
Scotch broom H. blackberry							Early					

Comments:

Total number of tree species>6": 1 understocked

sheet 2 of 9

Forest Sample Plot Field Data Sheet

Property: Julia's Gulch Prepared by: T. Dusek

Stand #: 2 Plot#: 3 Plot Size (BAF) 10 Date: _____

Basal Area in sf/acre:	Size Class of Trees within sample plot															
Tree Species	# of Trees 2-5.9" dbh			#of Trees 6-9.9" dbh			# of Trees 10-17.9"dbh			# of Trees 18-29.9" dbh			# of Trees > 30" dbh			Total
Crown Position	DOM	COD	OTH	DOM	COD	OTH	DOM	COD	OTH	DOM	COD	OTH	DOM	COD	OTH	
B.L. Maple				6				17,12 17								4
Black cottonwood								15								1
mt. Ash								14								1
Black locust								15								1
Red Alder				6 6 6 6				14,10 14 11								9
Total Number of Trees per Size Class	0			6			10			0			0			16
Number of standing dead trees 6" dbh or greater	0			0			0			0			0			0

1/100 Ac. Samples:

List of Common Understory Species 3'-20'	% Canopy Coverage						% Invasive Cover					
	C	N	E	S	W	Total	C	N	E	S	W	Total
Big Leaf maple saplings, I. plum Oceanspray, salmonberry Snowberry, b'berry hazelnut alder saplings						70						50
List of Herbaceous Species 0'-3'	**% Understory Cover 3'-20'**						**% Herbaceous/ Woody Cover 0'-3'**					
	C	N	E	S	W	Total	C	N	E	S	W	Total
fireweed, O. grape, S. fern, dewberry						80						20

List of Invasive Species	Plot Successional Stage:
H. blackberry Herb Robert	Mid

Comments: well stocked

Total number of tree species>6": 2

sheet 3 of 9

Forest Sample Plot Field Data Sheet

Property: Julia's Gulch Prepared by: T. Dusek

Stand #: 2 Plot#: 4 Plot Size: (BAF) 10 Date: _____

Basal Area in sf/acre:	Size Class of Trees within sample plot															
Tree Species	# of Trees 2-5.9" dbh			#of Trees 6-9.9" dbh			# of Trees 10-17.9"dbh			# of Trees 18-29.9" dbh			# of Trees > 30" dbh			Total
Crown Position	DOM	COD	OTH	DOM	COD	OTH	DOM	COD	OTH	DOM	COD	OTH	DOM	COD	OTH	
Red Alder	6.5 3.3 4			9			10 10 10									9
western red Cedar												18				1
Total Number of Trees per Size Class	5			1			3			1			0			10
Number of standing dead trees 6" dbh or greater	0			0			0			0			0			0

1/100 Ac. Samples:

List of Common Understory Species 3'-20'	% Canopy Coverage						% Invasive Cover					
Red Elderberry, Indian plum Salmonberry, snowberry, cedar saplings	C	N	E	S	W	Total 80	C	N	E	S	W	Total 10
List of Herbaceous Species 0'-3'	**% Understory Cover 3'-20'**						**% Herbaceous/ Woody Cover 0'-3'**					
lady fern, glyceria sp. S. fern	C	N	E	S	W	Total 20	C	N	E	S	W	Total 60
List of Invasive Species							**Plot Successional Stage:**					
Ivy H. b'berry							Early					

Comments: understocked

Total number of tree species>6": 1

sheet 4 of 9

Forest Sample Plot Field Data Sheet

Property: Julia's Gulch Prepared by: T. Dusek

Stand #: 2 Plot#: 5 Plot Size: (BAF) 10 Date: _____

Basal Area in sf/acre:	Size Class of Trees within sample plot															
Tree Species	# of Trees 2-5.9" dbh			#of Trees 6-9.9" dbh			# of Trees 10-17.9"dbh			# of Trees 18-29.9" dbh			# of Trees > 30" dbh			Total
Crown Position	DOM	COD	OTH	DOM	COD	OTH	DOM	COD	OTH	DOM	COD	OTH	DOM	COD	OTH	
Douglas Fir				9, 8, 9			11, 10, 13		1							6
Western Hemlock				6					11							2
Madrone									13, 13							2
Total Number of Trees per Size Class	0			4			6			0			0			10
Number of standing dead trees 6" dbh or greater	0			0			2			0			0			2

1/100 Ac. Samples:

List of Common Understory Species 3'-20'	% Canopy Coverage						% Invasive Cover					
	C	N	E	S	W	Total	C	N	E	S	W	Total
fir saplings, bigleaf maple saplings, red elderberry, Oceanspray, Evergreen huckleberry, hawthorn, I. plum, vine maple						60						<5%
List of Herbaceous Species 0'-3'	**% Understory Cover 3'-20'**						**% Herbaceous/ Woody Cover 0'-3'**					
	C	N	E	S	W	Total	C	N	E	S	W	Total
false Solomon's seal, salal, sword fern, dewberry						30						10

List of Invasive Species		Plot Successional Stage:
B'berry, Ivy		mid

Comments:

Total number of tree species>6": 2 well stocked

sheet 5 of 9

Forest Sample Plot Field Data Sheet

Property: Julia's Gulch Prepared by: T. Dusek

Stand #: 2 Plot#: 6 Plot Size: (BAF) 10 Date: _____

Basal Area in sf/acre:	Size Class of Trees within sample plot															
Tree Species	# of Trees 2-5.9" dbh			#of Trees 6-9.9" dbh			# of Trees 10-17.9"dbh			# of Trees 18-29.9" dbh			# of Trees > 30" dbh			Total
Crown Position	DOM	COD	OTH	DOM	COD	OTH	DOM	COD	OTH	DOM	COD	OTH	DOM	COD	OTH	
Douglas fir									16							1
Big Leaf maple										22 20 20			32			4
Red Alder							14 15 13									3
Madrone										16						1
Total Number of Trees per Size Class	0			0			4			4			1			9
Number of standing dead trees 6" dbh or greater							2									2

1/100 Ac. Samples:

List of Common Understory Species 3'-20'	% Canopy Coverage						% Invasive Cover					
fir sapling, I. plum, hazel maple sapling, yew,	C	N	E	S	W	Total 80	C	N	E	S	W	Total 80
List of Herbaceous Species 0'-3'	**% Understory Cover 3'-20'**						**% Herbaceous/ Woody Cover 0'-3'**					
sword fern, braken fern, dewberry	C	N	E	S	W	Total 60	C	N	E	S	W	Total 20
List of Invasive Species							**Plot Successional Stage:**					
Ivy, blackberry holly							mid					

Comments:

Total number of tree species>6": 3 well stocked

sheet 6 of 9

Forest Sample Plot Field Data Sheet

Property: Julia's Gulch Prepared by: T. Dusek

Stand #: 3 Plot#: 7 Plot Size: (BAF) 10 Date: _____

Basal Area in sf/acre:	Size Class of Trees within sample plot

Tree Species	# of Trees 2-5.9" dbh			#of Trees 6-9.9" dbh			# of Trees 10-17.9"dbh			# of Trees 18-29.9" dbh			# of Trees > 30" dbh			Total
Crown Position	DOM	COD	OTH	DOM	COD	OTH	DOM	COD	OTH	DOM	COD	OTH	DOM	COD	OTH	
B.L. Maple							14 15			22			32			4
Red Alder								13								1
Douglas Fir							16 16 16			20						4
Total Number of Trees per Size Class	0			0			6			2			1			9
Number of standing dead trees 6" dbh or greater	0			1			1			0			0			2

1/100 Ac. Samples:

List of Common Understory Species 3'-20'	% Canopy Coverage						% Invasive Cover					
	C	N	E	S	W	Total	C	N	E	S	W	Total
hazel, vine maple, fir saplings, red elderberry, thimbleberry, red raspberry, I. plum, salmonberry						60						<5
List of Herbaceous Species 0'-3'	**% Understory Cover 3'-20'**						**% Herbaceous/ Woody Cover 0'-3'**					
	C	N	E	S	W	Total	C	N	E	S	W	Total
sword fern, O. grape, dewberry, b. fern, salal						80						60

List of Invasive Species	Plot Successional Stage:
holly tree H. blackberry	mid

Comments:

Total number of tree species>6": 1 well stocked ctnwd present but not in plot

sheet 1 of 9

Forest Sample Plot Field Data Sheet

Property: Julia's Gulch Prepared by: T. Dusek

Stand #: 3 Plot#: 8 Plot Size: (BAF) 10 Date: _____

Basal Area in sf/acre:	Size Class of Trees within sample plot

Tree Species	# of Trees 2-5.9" dbh			#of Trees 6-9.9" dbh			# of Trees 10-17.9"dbh			# of Trees 18-29.9" dbh			# of Trees > 30" dbh			Total
Crown Position	DOM	COD	OTH	DOM	COD	OTH	DOM	COD	OTH	DOM	COD	OTH	DOM	COD	OTH	
B.L. Maple							17, 15			19						3
Douglas fir							16, 16, 12			18, 18,						5
Madrone												22				1
western hemlock									13							1
western cedar									12							1
Total Number of Trees per Size Class	0			0			7			4			0			11
Number of standing dead trees 6" dbh or greater	0			1			1			0			0			2

1/100 Ac. Samples:

List of Common Understory Species 3'-20'	% Canopy Coverage						% Invasive Cover					
	C	N	E	S	W	Total	C	N	E	S	W	Total
fir saplings, I. plum, vine maple, red elderberry, oceanspray, alder saplings, snowberry, thimbleberry						80						<5
List of Herbaceous Species 0'-3'	**% Understory Cover 3'-20'**						**% Herbaceous/ Woody Cover 0'-3'**					
	C	N	E	S	W	Total	C	N	E	S	W	Total
Dewey's sedge, O. grape, lady fern, sword fern						40						60

List of Invasive Species	Plot Successional Stage:
Ivy, H. blackberry	Mid

Comments:

Total number of tree species>6": 1 well stocked

sheet 2 of 9

Forest Sample Plot Field Data Sheet

Property: Julia's Gulch Prepared by: T. Dusek

Stand #: 3 Plot#: 9 Plot Size: (BAF) 10 Date: _____

Basal Area in sf/acre:	Size Class of Trees within sample plot

Tree Species	# of Trees 2-5.9" dbh			#of Trees 6-9.9" dbh			# of Trees 10-17.9"dbh			# of Trees 18-29.9" dbh			# of Trees > 30" dbh			Total
Crown Position	DOM	COD	OTH	DOM	COD	OTH	DOM	COD	OTH	DOM	COD	OTH	DOM	COD	OTH	
B.L. Maple							16 16			29 27 27						5
Douglas fir				8						23 22 23 28						5
Red Alder							14 14									2
western hemlock							15									1
Total Number of Trees per Size Class	0			1			5			7			0			13
Number of standing dead trees 6" dbh or greater	0			0			0			0			0			0

1/100 Ac. Samples:

List of Common Understory Species 3'-20'	% Canopy Coverage						% Invasive Cover					
fir saplings, vine maple hazelnut	C	N	E	S	W	Total 50	C	N	E	S	W	Total 60
List of Herbaceous Species 0'-3'	**% Understory Cover 3'-20'**						**% Herbaceous/ Woody Cover 0'-3'**					
S. fern Dewberry,	C	N	E	S	W	Total 60	C	N	E	S	W	Total 30

List of Invasive Species	Plot Successional Stage:
H. blackberry	mid

Comments:

Total number of tree species>6": 1 well stocked

sheet 9 of 9

Appendix C

Stand Summary Sheets

Property Name: Julia's Gulch **Location: Tacoma, Washington** **Prepared By: AHBL** **Date: September 2010 and March 2011**		
Stand Variable	**Stand # 1**	**Stand # 2**
Plot Number (s)	**1 and 2 (Restoration Area H and I)**	**3, 4, 5 and 6**
1. Dominate species/ Co-dominant species	Madrone, Douglas Fir	Alder, Big Leaf Maple
2. Successional stage	Early	Mid
3. Basel Area in square feet/acre	45	112.5
4. Size class of dominant species	3 – 24"	6 – 20"
5. Percent canopy closure	20	73
6. Number of tree species per plot	2	4
7. Common understory species	Madrone saplings, alder saplings, and oceanspray	Indian plum, salmonberry, Douglas fir saplings, hazelnut, big leaf maple saplings, yew, red elderberry, oceanspray, evergreen huckleberry, hawthorn, vine maple, snowberry, and cedar saplings
8. Percent of understory cover 3' to 20' tall	20	53
9. Number of woody plant species 3' to 20' tall	3	13
10. Common herbaceous species 0' to 3' tall	Mullen, red and white clover, bentgrass, goldenrod, and western fescue	Dewberry, sword fern, fringe cup, bracken fern, false Solomon's seal, salal, lady fern, glyceria, fireweed, and Oregon grape
11. Percent of herbaceous & woody plant cover 0' to 3' tall	50	28
12. List of major invasive plant species & percent of cover	Scot's broom, 30% Himalayan blackberry, 20%	English ivy, 30% Himalayan blackberry, 50%
13. Number of standing dead trees 6" DBH or greater	0	4
14. Comments		
Forest Stand Summary Worksheet		Sheet 1 of 3

Property Name: Julia's Gulch **Location: Tacoma, Washington** **Prepared By: AHBL** **Date: September 2010 and March 2011**		
Stand Variable	**Stand # 3**	
Plot Number (s)	**7, 8, and 9**	
1. Dominate Species/ Co-dominant species	Big Leaf Maple, Douglas Fir	
2. Successional stage	Mid	
3. Basel Area in square feet/acre	110	
4. Size class of dominant species	14 - 29"	
5. Percent canopy closure	63	
6. Number of tree species per plot	4	
7. Common understory species	Indian plum, red elderberry, hazelnut, salmonberry, thimbleberry, vine maple, and snowberry	
8. Percent of understory cover 3' to 20' tall	60	
9. Number of woody plant species 3' to 20' tall	6	
10. Common herbaceous species 0' to 3' tall	Sword fern, salal, dewberry, Oregon grape, bracken fern, Dewey's sedge, and lady fern	
11. Percent of herbaceous & woody plant cover 0' to 3' tall	50	
12. List of major invasive plant species & percent of cover	English ivy, 5% English holly, 5% Himalayan blackberry, 60%	
13. Number of standing dead trees 6" DBH or greater	4	
14. Comments	Cottonwood present but not in the plots. Appropriately stocked.	
Forest Stand Summary Worksheet		Sheet 2 of 3

Appendix D

Vegetative Species Identified at Julia's Gulch

Appendix D: Vegetative Species Identified at Julia's Gulch		
Stratum	**Scientific Name**	**Common Name**
Tree	*Acer circinatum*	Vine Maple
	Acer macrophyllum	Big Leaf Maple
	Aesculus indica	Horse Chestnut
	Alnus rubra	Red Alder
	Arbutus menziesii	Madrone
	Crataegus douglasii	Black Hawthorn
	Cratagus sp.	Hawthorn
	Fraxinus latifolia	Oregon Ash
	Malus (pyrus) fusca	Western Crabapple
	Populus balsamifera	Black Cottonwood
	Prunus emarginata	Bitter Cherry
	Prunus sp.	Cherry
	Populus sp.	Poplar
	Pseudotsuga menziesii	Douglas Fir
	Rhamnus purshiana	Cascara
	Robinia pseudoacacia	Locust
	Salix lucida	Pacific Willow
	Sorbus sitchensis	Mountain Ash
	Taxus brevifolia	Pacific Yew
	Thuja plicata	Western Red Cedar
	Tsuga heterophylla	Western Hemlock
Shrub	*Buddleja davidii*	Butterfly Bush
	Cornus sericea	Red-osier Dogwood
	Corylus cornuta	Beaked Hazelnut
	Cytisus scopairus	Scot's broom
	Gaultheria shallon	Salal
	Holodiscus discolor	Oceanspray
	Ilex aquifolium	Holly
	Mahonia aquifolium	Tall Oregon Grape
	Oemleria cerasiformis	Indian Plum
	Ribes sanguinium	Flowering Red Current
	Rosa pisocarpa	Clustered Rose
	Rubus discolor	Himalayan Blackberry
	Rubus leucodermis	Blackcap Raspberry
	Rubus parviflorus	Thimbleberry
	Rubus spectabilis	Salmonberry
	Sambucus racemosa	Red Elderberry
	Symphoricarpos albus	Snowberry
	Vaccinium ovatum	Evergreen Huckleberry
Herb/Grass	*Agropyron repens*	Quackgrass
	Agrostis alba/gigantea	Redtop
	Athyrium filix-femina	Lady Fern
	Carex deweyana	Dewey's Sedge
	Claytonia sibirica	Miner's lettuce
	Dactylis glomerata	Orchardgrass
	Dicentra formosa	Bleeding Heart
	Digitalis purpurea	Foxglove
	Epilobium angustifolium	Fireweed

Appendix D: Vegetative Species Identified at Julia's Gulch		
Stratum	**Scientific Name**	**Common Name**
	Equisetum arvense	Field Horsetail
	Equisetum telmateia	Giant Horsetail
	Festuca occidentalis	Western Fescue
	Geranium robertianum	Herb Robert
	Geum macrophyllum Willd.	Large Leaf Avens
	Glyceria elata	Manna grass, tall
	Holcus lanatus	Common Velvet Grass
	Hypochaeris radicata	Hairy Cat's Ear
	Mahonia nervosa	Low Oregon Grape
	Maianthemum dilatatum	False Lily-of-the-Valley
	Petasites palmatus	Coltsfoot
	Plantago lanceolata	English/ Rib Plantain
	Polypodium glycyrrhiza	Licorice Fern
	Polystichum munitum	Sword Fern
	Pteridium aquilinum	Bracken Fern
	Ranunculus repens	Creeping Buttercup
	Rumex crispus	Curly Dock
	Smilacina racemosa	False Solomon's Seal
	Tellima grandiflora	Fringe Cup
	Tiarella trifoliata	Foam flower
	Tolmiea menziesii	Youth-on-Age/ Piggyback Plant
	Trifolium pratense	Red Clover
	Trifolium repens	White Clover
	Trillium ovatum	Trillium
	Urtica dioica	Stinging Nettle
Vine	*Galium aparine*	Cleavers/ Catchweed Bedstraw
	Hedra helix	English Ivy
	Lonicera ciliosa	Orange Honeysuckle
	Rubus ursinus	Trailing Blackberry/Dewberry

Notes:

- This listing represents the major plant species identified on the site during visits. There may be other species present on the project site that are not listed.
- Scientific names and species identification taken from *Flora of the Pacific Northwest* (Hitchcock and Cronquist, 1973), and the USDA Plant Database.

Appendix E

The 2009 Pierce County Noxious Weed List

THE 2009 PIERCE COUNTY NOXIOUS WEED LIST

CLASS A WEEDS – Eradication of these species required by law throughout Washington State

Common name	***Scientific name***
buffalobur	*Solanum rostratum*
common crupina	*Crupina vulgaris*
cordgrass, dense flower	*Spartina densiflora*
cordgrass, salt meadow	*Spartina patens*
cordgrass, smooth	*Spartina alterniflora*
dyers woad	*Isatis tinctoria*
eggleaf spurge	*Euphorbia oblongata*
false brome	*Brachyopodium sylvaticum*
floating primrose willow	*Ludwigia peploides*
flowering rush	*Butomus umbellatus*
garlic mustard	*Alliaria petiolata*
giant hogweed	*Heracleum mantegazzianum*
goatsrue	*Galega officinalis*
hawkweed, European	*Hieracium sabaudum*
hawkweed, yellow devil	*Heracium floribundum*
hydrilla	*Hydrilla verticillata*
johnsongrass	*Sorghum halepense*
knapweed, bighead	*Centaurea macrocephala*
knapweed, Vochin	*Centaurea nigrescens*
kudzu	*Pueraria Montana var. lobata*
meadow clary	*Salvia pratensis*
purple starthistle	*Centaurea calcitrapa*
reed sweetgrass	*Glyceria maxima*
ricefield bulrush	*Shoenoplectus mucronatus*
sage, clary	*Salvia sclarea*
sage, Mediterranean	*Salvia aethiopsis*
shiny geranium	*Geranium lucidum*
silverleaf nightshade	*Solanum elaeagnifolium*
Spanish broom	*Spartium junceum*
spurge flax	*Thymelaea passerine*
Syrian bean-caper	*Zygophyllum fabago*
Texas blueweed	*Helianthus ciliaris*
thistle, Italian	*Carduus pycnocephalus*
thistle, milk	*Silybum marianum*
thistle, slenderflower	*Carduus tenuiflorus*
variable-leaf milfoil	*Myriophyllum heterophyllum*
velvetleaf	*Abutilon theophrasti*
wild four o'clock	*Mirabilis nyctaginea*

CLASS B WEEDS – Control of these species is required by law in Pierce County

Common name	***Scientific name***
Australian fieldcress	*Rorippa austriaca*
blackgrass	*Alopecurus myosuroides*
blueweed	*Echium vulgare*
bugloss, annual	*Anchusa arvensis*
bugloss, common	*Anchusa officinalis*
camelthorn	*Alhagi maurorum*
common fennel	*Foeniculum vulgare*
common reed	*Phragmites australis (non-native genotypes)*
Dalmatian toadflax	*Linaria dalmatica*
Eurasian watermilfoil	*Myriophyllum spicatum*
fanwort	*Cabomba caroliniana*
gorse	*Ulex europaeus*
grass-leaved arowhead	*Sagittaria graminea*
hawkweed, common	*Hieracium, lachenalii*
hawkweed, mouse ear	*Hieracium pilosella*
hawkweed, non-native	*Hieracium spp.*
hawkweed, orange	*Hieracium aurantiacum*
hawkweed, oxtongue	*Picris hieraciodes*
hawkweed, polar	*Hieracium atratum*
hawkweed, queen-devil	*Hieracium glomeratum*
hawkweed, smooth	*Hieracium laevigatum*
hawkweed, yellow	*Hieracium caespitosum*
hoary alyssum	*Berteroa incana*
indigobush	*Amorpha fruticosa*
knapweed, black	*Centaurea nigra*
knapweed, brown	*Centaurea jacea*
knapweed, diffuse	*Centaurea diffusa*
knapweed, meadow	*Centaurea jacea x nigra*
knapweed, Russian	*Acroptilon repens*
knapweed, spotted	*Centaurea stoebe*
kochia	*Kochia scoparia*
lawnweed	*Solvia sessilis*
lepyrodicilis	*Lepyrodiclis holosteoides*
longspine sandbur	*Cenchrus longispinus*
loosestrife, garden	*Lysimachia vulgaris*
loosestrife, purple	*Lythrum salicaria*
loosestrife, wand	*Lythrum virgatum*
parrotfeather	*Myriophyllum aquaticum*
perennial pepperweed	*Lepidium latifolium*
perennial sowthistle	*Sonchus arvensis*

Common name	***Scientific name***
policeman's helmet	*Impatiens glandulifera*
poison hemlock	*Conium maculatum*
rush skeletonweed	*Chondrilla juncea*
saltcedar	*Tamarix ramosissima*
spurge, leafy	*Uphorbia esula*
sulfur cinquefoil	*Potentilla recta*
swainsonpea	*Sphaerophysa salsula*
tansy ragwort	*Senecio jacobaea*
thistle, musk	*Carduus nutans*
thistle, plumeless	*Carduus acanthoides*
thistle, Scotch	*Onopordum acanthium*
water primrose	*Ludwigia hexapetala*
white bryony	*Bryonia alba*
wild chervil	*Anthriscus sylvestris*
yellow floating heart	*Nymphoides peltata*
yellow nutsedge	*Cyperus esculentus*
yellow starthistle	*Centaurea solstitialis*

NON-REGULATED NOXIOUS WEEDS – These are class B and C weeds that we highly recommend you control on your property due to the environmental and economic damage caused by their spread; but control is not legally required in Pierce County.

Common name	***Scientific name***
baby's breath	*Gypsophilia paniculata*
blackberry, evergreen	*Rubus laciniatus*
blackberry, Himalayan	*Rubus armeniacus*
Brazilian elodea	*Egeria densa*
butterfly bush	*Buddleja davidii*
cockle, white	*Silene latifolia ssp. Alba*
cocklebur, spiny	*Xanthium spinosum*
common tansy	*Tanacetum vulgare*
cress, hoary	*Cardaria draba*
dodder, smoothseed alfalfa	*Cuscuta approximata*
ivy, Atlantic	*Hedera hibernica*
ivy, English *(three cultivars only)*	*Hedera helix 'Baltica', 'Pittsburgh', 'Star'*
field bindweed	*Convulvulus arvensis*
fragrant waterlily	*Nymphaea odorata*
goatgrass, jointed	*Aegilops cylindrical*
groundsel, common	*Senecio vulgaris*
herb Robert	*Geranium robertianum*
knotweed, Bohemian	*Polygonum bohemicum*

Common name	***Scientific name***
knotweed, giant	Polygonum sachalinese
knotweed, Himalayan	*Polygonum polystachyum*
knotweed, Japanese	*Polygonum cuspidatum*
mayweed, scentless	*Matricaria perforata*
old man's beard	*Clematis vitalba*
pondweed, curly-leaf	*Potamogeton crispus*
reed canarygrass	*Phalaris arundinacea*
rye, cereal	*Secale cereale*
Scotch broom	*Cytisus scoparius*
Spikeweed	*Hemizxonia pungens*
St. Johnswort, common	*Hypericum perforatum*
thistle, bull	*Cirsium vulgare*
thistle, Canada	*Cirsium arvense*
whitetop, hairy	*Cardaria pubescens*
willow-herb, hairy	*Epilobium hirsutum*
wormwood, absinth	*Artemisia absinthium*
yellow archangel	*Lamiastrum galeobdolon*
yellow flag iris	*Iris pseudacorus*
yellow toadflax	*Linaria vulgaris*

Appendix F

Native, Nonnative, and Invasive Species Plant Inventory

JULIA'S GULCH NATIVE AND INVASIVE PLANT INVENTORY

Date: September through November, 2010

Data Collected by: Theresa Dusek, Chuck Buzzard, Rosemary Lowery, Nancy Magee, Dan Nesheim, and John Thurlow

Holly	Ilex aquifolium		x		x			x			x
Knotweed	Polygonum spp.	x	x	x							
Scots broom	Cytisus scoparius								x	x	

JULIA'S GULCH NATIVE AND INVASIVE PLANT INVENTORY

Date: September through November, 2010

Data Collected by: Theresa Dusek, Chuck Buzzard, Rosemary Lowery, Nancy Magee, Dan Nesheim, and John Thurlow

Common name	Latin name	Restoration Areas (see map for locations)									
		A	B	C	D	E	F	G	H	I	J
NATIVES											
Beaked hazelnut	Corylus cornuta	x	x	x		x	x	x			x
Bedstraw	Galium sp.					x	x	x			
Big leaf maple	Acer macrophyllum	x	x	x	x	x		x			x
Bitter cherry	Prunus emarginata			x							
Blackcap raspberry	Rubus leucodermis	x				x	x				
Bleeding heart	Dicentra formosa					x	x				
Bracken fern	Pteridium aquilinum	x	x	x		x	x	x			x
Buttercup	Ranunculus repens					x	x				
Cascara	Rhamnus pushiana							x			
Dewey's sedge	Carex deweyana	x			x	x	x	x			x
Coltsfoot	Petasites palmatus				x						
Cottonwood	Populus balsamifera	x	x				x		x	x	x
Dogwood	Cornus stolonifera						x				
Douglas-fir	Pseudotsuga menziesii			x	x	x		x		x	x
Douglas spirea	Spirea douglasii						x				
Elderberry	Sambucus racemosa				x	x	x	x			x
Evergreen huckleberry	Vaccinium ovatum							x			x
False lily-of-valley	Maianthemum dilatatum					x		x			
False solomon's seal	Smilacina racemosa				x	x		x			
Western Fescue	Festuca occidentalis								x	x	
Fireweed	Epilobium angustifolium		x					x			x
Flowering red current	Ribes sanguineum	x									x
Foxglove	Digitalis purpurea	x						x		x	
Fringecup	Tellima grandiflora	x									
Glyceria spp.	Glyceria spp.		x			x	x				
Giant Horsetail	Equisetum telmatiea		x		x	x	x				
Hawthorn	Craegus columbiana	x		x			x				x
Honeysuckle	Lonicera ciliosa							x			x
Lady fern	Athyrium felix femina					x	x				
Indian plum	Oemleria cerasimformis	x			x	x	x	x			x
Licorice fern	Polypodium glycyrrhiza	x	x	x	x	x		x			x
Low Oregon grape	Berberis parvifloris	x	x		x			x			x
Large leaf avens	Geum macrophyllum				x	x	x				
Madrone	Arbutus menziesii				x			x	x	x	
Miner's lettuce	Claytonia sibirica				x	x	x	x			x
Mountain ash	Sorbus sp.	x	x								
Ocean spray	Holodiscus discolor		x		x			x			
Pacific yew	Taxus brevifolia					x					
Pearly everlasting	Amnaphalis margaritacea	x			x	x	x			x	x
Ponderosa pine	Pinus ponderosa										

JULIA'S GULCH NATIVE AND INVASIVE PLANT INVENTORY

Date: September through November, 2010

Data Collected by: Theresa Dusek, Chuck Buzzard, Rosemary Lowery, Nancy Magee, Dan Nesheim, and John Thurlow

Quack grass	Agropyron repens				x						
Quaking aspen	Populus tremuloides										
Red alder	Alnus rubrus	x	x	x	x	x	x	x			x
Red huckleberry	Vaccinium parvifolium							x			x
Red osier dogwood	Cornus stolonifera		x					x			
Rhododendron	Rhododendron sp.										
Rose, baldhip	Rosa gymnocarpa						x				
Salal	Gaultheria shallon							x			x
Sitka spruce	Picea sitchensis										
Slough sedge	Carex obnupta										
Salmonberry	Rubus spectabilis		x			x	x				
Serviceberry	Amelanchier alnifolis			x				x			x
Shore pine	Pinus contorta										
Sorrel	Oxalys oregana										
Snowberry	Symphoricarpos alnus		x		x	x		x			x
Star flower	Trientalis latifolia					x		x			
Stinging nettle	Urtica dioica					x	x				
Sword fern	Polystichum munitum	x	x	x	x	x	x	x			x
Tall Oregon grape	Berberis aquifolium							x			x
Thimbleberry	Rubus parviflorus				x	x	x	x			x
Trailing blackberry	Rubus ursinus	x	x	x	x	x	x	x	x	x	x
Trailing snowberry	Symphoricarpos mollis										
Trillium	Trillium ovatum							x			x
Yellow violet	Viola sempervirens										
Vanillia Leaf	Achlys triphylla					x					
Vine maple	Acer circinatum				x	x		x			x
Western hemlock	Tsuga heterophylla			x	x	x		x			x
Western red cedar	Thuja plicata	x			x	x		x			x
Willow	Salix spp.						x				
NON-NATIVES											
Butterfly bush	Buddleja davidii		x		x						
Cherry	Prunus sp.										
Chestnut	Aesculus indica	x		x							x
Cotoneaster	Cotoneaster sp.										
Grape hyacinth	Hyacinthus sp.										
Locust	Robinia pseudoacacia			x							
Privet	Ligustrum sp.										
Sweetbriar rosa	Rosa eglanteria										
Nightshade	Solanum dulcamara					x	x				
INVASIVES	Provide % cover estimate										
Cherry laurel	Prunus laurocerasus				x						
English ivy	Hedera helix			x	x	x	x				x
Herb Robert	Geranium robertianum			x	x	x	x	x			
Himalayan blackberry	Rubus armeniacis	x	x	x	x	x	x	x	x	x	x

Appendix G

Planting Schedule and Specifications

Common Name	Scientific Name	Area A (37,237 sf)	Area B (135,153 sf)	Area C (268,965 sf)	Area D (20,257 sf)	Area E (289,883 sf)	Area F (72,838 sf)	Area G (282,890 sf)	Area H (82,523 sf)	Area I (13,520 sf)	Area J * (161,850 sf)
Trees		Complete	345	686	52	370	278	144	210	70	0
Big Leaf Maple	Acer macrophyllum		X	X	X						
Bitter Cherry	Prunus emarginata						X				
Black Hawthorne	Crataegus douglasii		X	X	X	X	X			X	
Cascara	Rhamnus purshiana					X	X				
Crabapple	Malus fusca					X	X				
Douglas Fir	Pseudotsuga menziesii	X	X	X				X	X	X	
Grand Fir	Abies grandis					X	X	X			
Oregon Ash	Fraxinus latifolia			X							
Pacific Dogwood	Cornus nuttallii	X	X		X	X	X	X			
Pacific Madrone	Arbutus menziesii							X	X	X	
Pacific Yew	Taxus brevifolia					X	X	X			
Paper Birch	Betula papyrifera										
Quaking Aspen	Populus tremula										
Spruce, Sitka	Picea sitchensis					X	X				
Western Hemlock	Tsuga heterophylla			X		X	X				
Western Red Cedar	Thuja plicata					X	X				
Shrubs		10	1877	5977	450	750	2023	786	420	2292	0
Beaked Hazelnut	Corylus cornuta		X	X			X	X		X	
Black Current	Ribes laxiflorum					X	X				
Black Gooseberry	Ribes lacustre					X	X				
Black Raspberry	Rubus leucodermis					X	X				
Black Twinberry	Lonicera involucrata			X		X	X				
Blue Elderberry	Sambucus cerulea			X		X	X	X			
Evergreen Huckleberry	Vaccinium ovatum							X			
Indian Plum	Oemleria cerasiformis		X	X	X	X	X	X		X	
Kinnikinnick	Arctostaphylos uva-ursi							X			
Mock Orange	Philadelphus lewisii	X	X	X	X						
Orange Honeysuckle	Lonicera ciliosa			X				X			
Oceanspray	Holodiscus discolor		X		X			X	X	X	
Oregon Grape, low	Mahonia nervosa		X		X			X		X	
Oregon Grape, tall	Mahonia (Berberis) aquifolium		X		X			X		X	
Pacific Ninebark	Physocarpus capitatus					X	X				
Pacific Rhododenron	Rhododendron macrophyllum	X	X		X						
Red Elderberry	Sambucus racemosa	X	X	X	X	X	X	X			
Red Flowering Currant	Ribes sanquineum	X	X	X	X	X	X	X			
Red-osier Dogwood	Cornus stolonifera						X				
Rosa Nootka	Rosa nutkana		X		X		X				
Wood Rose	Rosa gymnocarpa		X		X		X			X	
Cluster Rose	Rosa pisocarpa		X	X	X		X				
Salal	Gaultheria shallon		X		X			X			
Salmonberry	Rubus spectabilis					X	X				
Serviceberry	Amelanchier alnifolia			X	X			X	X	X	
Snowberry	Symphoricarpos albus							X	X	X	

Thimbleberry	Rubus parviflorus					X		X			X
Vine Maple	Acer circinatum		X	X	X		X				
Herbaceous, ferns, and vines		**Number of Plants Available**									
Bunchberry	Cornus canadensis										
Candyflower	Calptridium										
Coastal Strawberry	Fragaria chiloensis										
Columbia Lily	Lilium columbianum										
Cooley's Hedge nettle	Stachys cooleyae										
Deer Fern	Blechnum spicant										
Dewberry	Rubus ursinus										
Fawn Lily	Erythronium oregonum										
Fairy Bells	Disporum smithii										
Fireweed	Epilobium angustifolium										
Foamflower	Tiarella trifoliate										
Fringecup	Tolmeia menziesii										
Lady Fern	Athyrium filix-femina										
Large Leaf Avens	Geum macrophyllum										
Orange Honeysuckle	Lonicera ciliosa										
Pacific Bleedingheart	Dicentra Formosa										
Pearly Everlast	Anaphalis margaritacea										
Prunella (Self Heal)	Prunella linearis										
Rattlesnake Plantain	Goodyera oblongifolia										
Sitka Sedge	Carex aquitalis										
Solomon Seal	Smilacina racemosa or stellata										
Spreading Rush	Juncus ensifolius										
Star Flower False Solomon	Smilacena stellata										
Swamp lantern	Lysichiton americanus										
Sword Fern	Polystichum munitum										
Columbia Lily	Lilium columbianum										
Trillium	Trillium ovatum										
Twin Flower	Linnaea borealis										
Vanilla Leaf	Achlys triphylla										
Wood Rush	Luzula parviflora										
Wood Sorrel	Oxalis oregana										
Woodland Beardstounge	Nothocholone nemorosa										
Youth-On-Age	Tolmiea menziesii										
*Minor removal of non-native and invasive species required for stewardship enhancement; therefore, revegetation not required in Zone J.											