

WHITE PAPER

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Umatilla National Forest

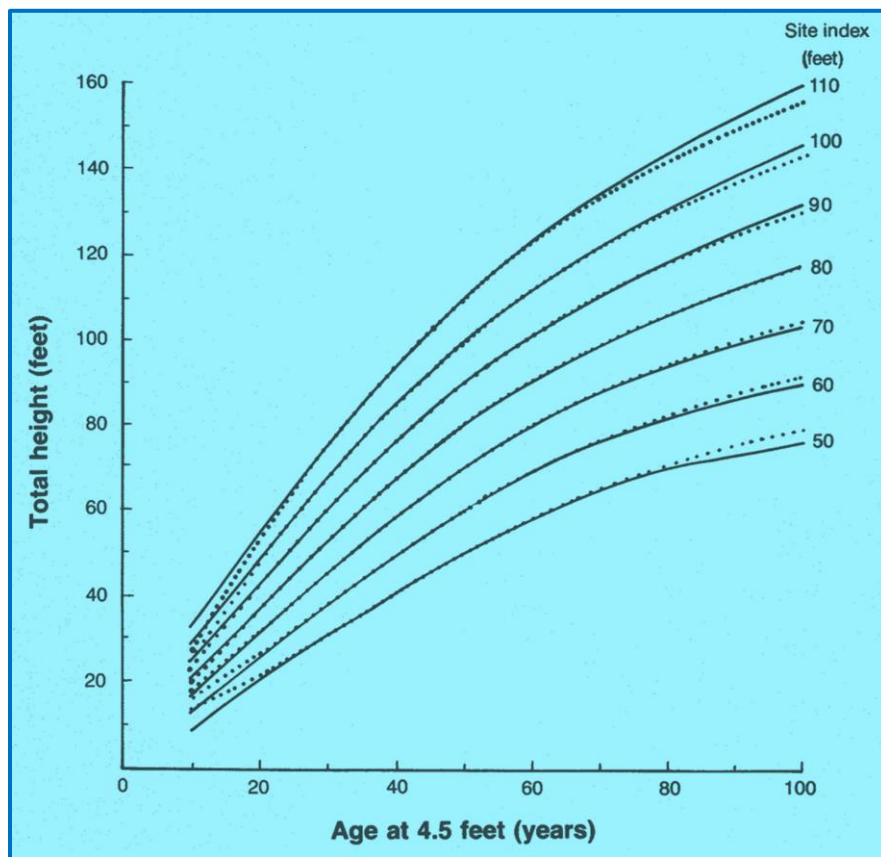
WHITE PAPER F14-SO-WP-SILV-35

Site Potential Tree Height Estimates for Pomeroy and Walla Walla Ranger Districts¹

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¹ White papers are internal reports receiving only limited review. Viewpoints expressed in this paper are those of the author – they may not represent positions of USDA Forest Service.

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INTRODUCTION

A Land and Resource Management Plan for Umatilla National Forest (USDA Forest Service 1990) was amended in 1994 by adding interim direction designed to “arrest the degradation and begin the restoration of aquatic habitat and riparian areas on lands administered by the Forest Service and BLM; it applies to watersheds outside the range of the northern spotted owl that provide habitat for Pacific salmon, steelhead, and sea-run cutthroat trout” (USDA Forest Service and USDI Bureau of Land Management 1995).

This tenth amendment to Umatilla NF’s Land and Resource Management Plan is commonly known as PACFISH. For forested environments, PACFISH uses a buffer concept to establish a riparian habitat conservation area (RHCA) along streams, rivers, lakes, and other wetlands. RHCA widths extend from edge of an active stream channel, and buffer widths vary with stream class and whether a stream is fish-bearing or not.

RHCAs can be established by using (1) specified feet of slope distance (such as 300 feet on each side of perennial, fish-bearing streams) or (2) numbers of “site potential tree heights” (such as 2 site-potential tree heights on each side of perennial, fish-bearing streams), depending on whichever method produces the greatest buffer distance. It is permissible to adjust PACFISH’s standard RHCA widths during watershed analysis, or after another site-specific analysis presenting a detailed rationale for RHCA modifications.

With one exception, Umatilla National Forest has elected to implement PACFISH by using its default buffer widths, in specified feet of slope distance, rather than basing buffer widths on a site potential tree height concept. The sole exception to this generalization is Walla Walla Ranger District, which has been recently using a site potential tree height alternative to establish RHCA buffer widths when applying PACFISH standards.

Because a Columbia Complex Fire Salvage Recovery Project includes National Forest System lands administered by both Pomeroy and Walla Walla Ranger Districts (hereafter referred to as north-end Districts), we were asked to complete an analysis for site potential tree heights for

both north-end Districts combined. Previous site potential tree height information was developed for just the Walla Walla Ranger District portion of northern Umatilla National Forest.

A primary objective of this report is to disclose results of an analysis examining site potential tree heights for Pomeroy and Walla Walla Ranger Districts combined. A secondary objective is to document procedures, methodologies, and techniques for how an analysis was conducted.

ANALYSIS ASSUMPTIONS

As far as we can determine, a PACFISH environmental assessment (EA) does not define what is meant by 'site potential tree height' (USDA Forest Service and USDI Bureau of Land Management 1994). PACFISH EA includes a 6-page glossary, but the glossary does not include terms such as 'site potential' or 'site-potential trees' or 'site potential tree height.' An initial step of our analysis was to define what is meant by 'site potential tree height.'

Site quality is defined as "the innate ability of a geographic area to produce biomass as determined by the prevailing soil type and condition, the moisture regimes, and the local climatic conditions" (Dunster and Dunster 1996).

[Note: White paper F14-SO-WP-Silv-5 examines site productivity definitions, concepts, and principles in quite a bit of detail.]

We assumed that 'site potential' indicates how closely existing conditions represent what is possible for an area. Possible conditions are assumed to reflect high ecological status, where vegetation characteristics are close to what would be expected, based on site quality of an area.

In a forestry context, site quality is traditionally estimated by using a measure called site index (SI). SI is defined as "a species-specific measure of actual or potential site quality, expressed in terms of the average height of trees included in a specified stand component" such as dominant and codominant trees (Helms 1998).

SI is derived by measuring total height and age (either breast-height age, or total age) for a certain number of 'top-height' trees (top-height trees are generally assumed to include only dominant and codominant crown classes of a stand). Measured values of height and age are then compared with published SI curves to determine an SI value for each measured site tree.

[Background information about site index curves: Site index curves are usually published as a set of curves, and all curves in a set are presented on a single graph (chart). Each successive curve in a set, progressing in a chart from bottom to top, varies by the same amount of height difference, in feet.

An example of site index curves is included on the cover page of this white paper – they show site index (solid lines) and height growth (dotted lines) curves for western larch (Cochran 1985). Note that seven curves are included on the larch chart, ranging from 50 feet to 110 feet in 10-foot increments. The larch site index curves use a base age of 50 years, and since the x-axis of the chart (horizontal axis) is labeled 'Age at 4.5 feet (years)', a user of these curves clearly knows that they are based on breast-height tree age (4½ feet), not on total tree age.

The curves are used in this way: Let's say that measured values of height and breast-height age for a dominant or codominant larch tree are 80 feet and 70 years. When plotting that combination of height and age on the chart, the value falls just below, but very close to, the line for site

index 70. If the measured site tree is a valid representative for this site (it is a 'good' site tree), then the apparent site index of the sampled area is 70 feet – top-height larch trees in this area would be expected to reach a total height of 70 feet when they are 50 years of age at breast height.]

SI refers to what is termed 'top height' because it estimates potential height of dominant and codominant trees; these are the tallest trees in a stand – the topmost layer for multi-layered stand structures. This means that site index does not provide an estimate of average stand height because certain crown classes (intermediate and subordinate trees) are intentionally not measured when selecting site trees.

If site trees selected for measurement are chosen carefully, and if they appropriately meet specifications associated with published SI curves (such as lack of top damage from budworm or defoliating insects, little or no evidence of growth suppression in an increment core, etc.), then *resulting SI values are assumed to provide an accurate assessment of site quality.*

SI values are expressed in feet – an SI value of 70 means that total height for dominant and codominant trees would be expected to average 70 feet at 50 years of age (if site index curves use 50 as a base age). If the curves use 100 as a base age, then an SI value of 70 means that dominant and codominant trees would average 70 feet in total height at 100 years of age.

Site index values pertain to a base age (such as 50 years or 100 years), and base age varies from one set of published curves to another. In the site index system, base age provides a mechanism for 'indexing' because the curves scale all measurements to a common baseline. Without scaling/indexing, it would be difficult to know if top-height differences reflect site quality variation, or the fact that a sampled stand had more time to grow (it was older) than another sampled stand.

Base age can (and often does) vary between tree species, and it is specified in each SI curve publication. For Umatilla National Forest, published sources of SI curves are provided in table 1.

For purposes of this 'site potential tree height' analysis, it is assumed that site tree information will serve as an objective (rather than subjective) data source for characterizing tree heights associated with 'site potential' conditions in forested RHCA environments of northern Umatilla NF.

Table 1: Source of site index curves for Umatilla National Forest tree species.

Tree Species	Species Code	Site Index Source	Base Age (Years)	Age Limit (Years)
Engelmann spruce	PIEN	Brickell 1966	50 (total)	≤ 200
Grand fir	ABGR	Cochran 1979b	50 (BH)	≤ 100
Interior Douglas-fir	PSME	Cochran 1979a	50 (BH)	≤ 100
Lodgepole pine	PICO	Dahms 1975	90 (BH)	≤ 120
Ponderosa pine	PIPO	Barrett 1978	100 (BH)	≤ 140
Subalpine fir	ABLA2	Used Brickell 1966	50 (total)	≤ 200
Western larch	LAOC	Cochran 1985	50 (BH)	≤ 100

Sources/Notes: Species Code is an alphanumeric code used for species identification in CVS database; "BH" in Base Age column indicates that a base age pertains to breast-height tree age rather than total tree age; Age Limit is an age range of measured site trees for which a site index curve is applicable (trees beyond this age range should not be selected as a site tree, according to published specifications for the site index curves).

DATA SOURCES

In 1990s, Blue Mountains national forests (e.g., Malheur, Umatilla, and Wallowa-Whitman National Forests) installed a grid-based inventory system called Current Vegetation Survey (CVS) (USDA Forest Service 1995). CVS plots were installed on a 1.7-mile grid (each plot was located 1.7 miles away from adjoining plots) except for designated Wilderness areas, where grid spacing was 3.4 miles between plots.

For Blue Mountains national forests of northeastern Oregon, southeastern Washington and west-central Idaho, initial installation of forested plots occurred in 1993 and 1994; nonforested plots were established across all three national forests in 1995 and 1996. Plot information collected during this 1993-1996 period is referred to as occasion 1 data.

Since their initial installation, every CVS plot has been remeasured once, and this subsequent information is referred to as occasion 2 data. Umatilla National Forest has 640 CVS plots divided into four panels; fourth and final panel of CVS plots was remeasured in 2005.

When considering data sources providing measured values for a wide range of tree attributes, CVS information is generally acknowledged to be the best Blue Mountains dataset because its grid-based approach prevents plot location bias, and because its quality control/quality assurance emphasis was very high (Max et al. 1996). For this reason, it was decided to use CVS information for an analysis of site potential tree heights for two north-end Districts of Umatilla NF.

Scope of this analysis includes river and stream segments for which a PACFISH amendment to Umatilla National Forest's Land and Resource Management Plan applies; the Forest's geographic information system (GIS) was used to identify applicable river/stream segments (fig. 1).

GIS analysis software was used to intersect (overlay) class 1-4 stream segments with CVS plot locations. This analysis step identified CVS plots and points located within PACFISH RHCAs (as estimated by using default buffer widths). Result of this step is presented in figure 1.

After using a GIS analysis to identify CVS plots and points occurring within buffered stream segments, a Forest-wide CVS database was queried to extract site tree information associated with these plots and points. This information, provided in tables 2 and 3, was used when analyzing site potential tree height.

Note that not all CVS plots and points identified by a GIS analysis had site tree records available; table 3 shows CVS plots and points occurring in stream buffers that did not have associated site tree records.

North-End Umatilla National Forest CVS Plots in Class 1 - 4 Stream Buffers

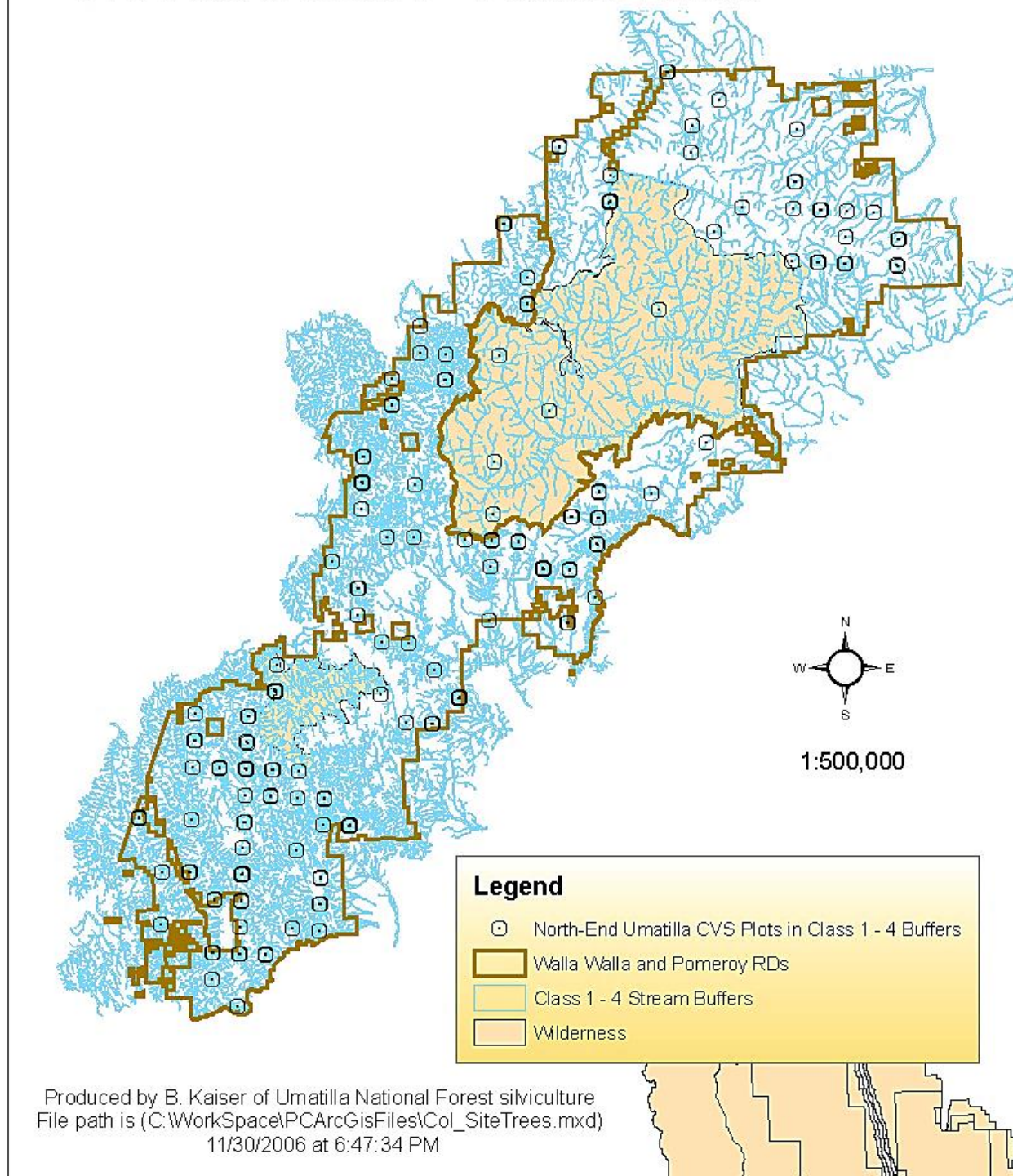


Figure 1 – Location and distribution of CVS plots, and river and stream segments, used for an analysis of site potential tree height.

ANALYSIS METHODOLOGY

Tree height varies with site potential, and variation in site potential can be characterized by using a concept called potential vegetation. Therefore, a mid-scale hierarchical unit of potential vegetation (potential vegetation groups) was used to stratify site potential into three categories (Cold Upland Forest; Moist Upland Forest; Dry Upland Forest).

Potential vegetation is represented in a CVS database by using Ecoclass codes. Each CVS plot consists of a 5-point cluster, and an Ecoclass code was recorded for each of five points. Site trees are coded to the sample point they occur on, so an Ecoclass code was associated with each site tree record by relating site trees to their respective CVS plot and point identifiers.

Ecoclass code was used, in conjunction with a look-up or cross-walk table (appendix 1; Powell et al. 2007), to assign a potential vegetation group (PVG) code to each site tree record in an analysis database (each Ecoclass code has been assigned to one, and only one, PVG).

PVG categories were used for stratification purposes when generating mean (average) values of site index, and when calculating site potential tree height.

A cursory examination of table 2 might indicate that SI was analyzed by using two levels of stratification: an initial stratification by PVG, and a second stratification by tree species. Closer examination, however, reveals that tree species were grouped within a PVG, but SI means were calculated only at a PVG level.

Grouping species within a PVG (see table 2) was done solely to facilitate application of mathematical SI equations – grouping had no bearing on SI and site potential tree height calculations.

RESULTS

Results of a site potential tree height analysis are discussed by PVG, a mid-scale potential vegetation unit used for stratification purposes (see appendix 1).

1. Cold Upland Forest PVG apparently has limited areal extent within PACFISH RHCAs on north-end Districts: only one CVS plot and point falling within a PACFISH stream segment (fig. 1) had an Ecoclass code assigned to the Cold Upland Forest PVG.

Mean site index for a single grand fir sample tree in Cold Upland Forest PVG was 55.5 feet at a base age of 50 years. Because site index curves are presented in increments of 10 feet, this result was rounded to the nearest 10 feet (60 in this instance).

Referring to the published grand fir site index curve for 60 feet (Cochran 1979b) resulted in a predicted top-height of 95 feet, at a tree age of 100 years, for forested PACFISH RHCAs on **Cold Upland Forest PVG**.

Note: we recommend that this result NOT be used for a Columbia Complex Fire Salvage Recovery Project, or for any other planning or analysis purpose, because it is based on one measurement value only. In our opinion, it is inappropriate to base a site potential tree height estimate on a sample as limited as this one.

2. Dry Upland Forest PVG had a total of 30 CVS plots and points for which a measured site tree value was available; 29 site trees were for species with a base age of 50 years, and 1 site tree record pertained to a species with a base age of 100 years.

Of site tree records with a base age of 50 years, four tree species were represented, with Douglas-fir (22 records) having many more samples than grand fir (4), western larch (2), and Engelmann spruce (1) (table 2).

Mean site index for tree species with a base age of 50 years was 69.4 feet. Because site index curves are presented in increments of 10 feet, this result was rounded to the nearest 10 feet (70 in this instance).

Since Douglas-fir has the most site-tree records for this PVG, Douglas-fir site index curves were used. Referring to published Douglas-fir site index curves for 70 feet (Cochran 1979a) resulted in a predicted top-height of 105 feet, at a tree age of 100 years, for forested PACFISH RHCAs on **Dry Upland Forest PVG**.

Note: a single site tree record pertaining to a base age of 100 years was not used when calculating mean top-height for this PVG. Because the measured site-tree value (90.7 feet at 100 years) was less than a 100-year interpreted value for base-age-50 trees (105 feet at 100 years), it is believed that ignoring this single 100-year record has little influence on an overall result for this PVG.

3. As might be expected for PACFISH RHCAs, a Moist Upland Forest PVG apparently has broad areal extent on north-end Districts. It had a total of 155 CVS plots and points for which a measured site tree value was available; 152 site trees were for species with a base age of 50 years, and 3 site tree records pertained to species with base ages of 90 or 100 years.

Of site tree records with a base age of 50 years, five tree species were represented, with grand fir (77 records) having more samples than subalpine fir (2), western larch (8), Engelmann spruce (22), and Douglas-fir (43) (table 2).

Mean site index for tree species with a base age of 50 years was 75.5 feet. Because site index curves are presented in increments of 10 feet, this result was rounded to the nearest 10 feet (80 in this instance).

Since grand fir has the most site-tree records for this PVG, grand fir site index curves were used. Referring to published grand fir site index curves for 80 feet (Cochran 1979b) resulted in a predicted top-height of 120 feet, at a tree age of 100 years, for forested PACFISH RHCAs on **Moist Upland Forest PVG**.

Note: three site tree records pertaining to a base age of 90 or 100 years were not used when calculating mean top-height for this PVG. Because a mean value for these three trees (109.5 feet at 90-100 years) was less than a 100-year interpreted value for base-age-50 trees (120 feet at 100 years), it is believed that ignoring three 90- or 100-year records has little influence on overall results for this PVG.

Table 2: Site index measurements for CVS site trees occurring on plots and points located within buffered stream areas on Pomeroy or Walla Walla Ranger Districts of Umatilla National Forest.

CVS Plot Num.	CVS Point Num.	Eco-class	Potential Veg Group	Tree Num.	Veg Code	Tree Species	Tree DBH	Tree Age	Tree Height	A Value	B Value	Site Index (Feet)	Base Age	Site Tree Quality	Stream Class
2153376	3	CEF411	Cold UF	476	13	ABGR	20.8	110	93	0.7894	131.5445	<u>55.5</u>	50	M	3
Mean SI												55.5	50		
Cold UF PVG; Conversion of 50-year SI value (rounded to 60 feet) to a 100-year tree age by referring to published SI curves for ABGR: <u>95 feet</u>															
1156376	3	CWG111	Dry UF	731	13	ABGR	23.4	122	114	0.7597	134.7512	70.2	50	M	4
1168396	4	CWG113	Dry UF	762	13	ABGR	25.6	116	124	0.7742	133.4225	78.7	50	M	4
2185400	1	CWG111	Dry UF	354	13	ABGR	13.5	36	78	1.1132	63.0960	101.0	50	H	1
2185400	5	CWG111	Dry UF	363	13	ABGR	21.7	79	101	0.8784	114.4610	73.7	50	H	1
1166392	2	CWG111	Dry UF	238	13	LAOC	22.6	66	111	0.8933	89.4585	93.3	50	H	4
1166392	3	CWG111	Dry UF	239	13	LAOC	17.6	62	101	0.9142	85.9581	87.7	50	H	4
1166392	4	CWG111	Dry UF	631	13	PIEN	30.4	62	107			91.8	50	H	4
1150368	3	CDG112	Dry UF	143	13	PSME	16.0	50	65	1.0000	79.9707	65.0	50	H	2
1152364	1	CDG111	Dry UF	99	13	PSME	16.7	48	64	1.0254	77.4400	66.1	50	H	
1152364	2	CDG111	Dry UF	649	13	PSME	18.6	62	54	0.8786	93.5441	45.8	50	H	
1152364	4	CDS624	Dry UF	653	13	PSME	18.9	50	57	1.0000	79.9707	57.0	50	H	4
1154364	5	CDS711	Dry UF	252	13	PSME	13.0	48	70	1.0254	77.4400	72.2	50	H	3
1158368	2	CWG111	Dry UF	776	13	PSME	24.5	94	104	0.6865	118.4115	71.5	50	H	4
1158372	3	CDS624	Dry UF	13	13	PSME	18.0	75	84	0.7851	105.4282	64.1	50	H	4
1166376	5	CDS624	Dry UF	755	13	PSME	22.8	77	125	0.7730	107.0238	94.9	50	H	2
1172380	4	CDS711	Dry UF	464	13	PSME	20.1	93	108	0.6910	117.8409	74.6	50	H	4
2151370	3	CDS711	Dry UF	831	13	PSME	27.0	100	90	0.6612	121.6016	60.6	50	H	4
2151370	4	CDS711	Dry UF	286	13	PSME	24.7	100	105	0.6612	121.6016	70.5	50	H	4
2154370	5	CDS622	Dry UF	498	13	PSME	21.3	116	75	0.6025	128.3456	49.6	50	M	
2156362	1	CDS711	Dry UF	253	13	PSME	23.1	116	94	0.6025	128.3456	61.1	50	M	4
2157372	2	CDS711	Dry UF	683	13	PSME	29.1	114	100	0.6092	127.6302	64.9	50	M	4
2159366	3	CDS711	Dry UF	512	13	PSME	16.1	133	77	0.5500	133.1678	51.1	50	M	4
2161372	3	CWS322	Dry UF	709	13	PSME	25.3	118	133	0.5958	129.0277	84.2	50	M	1
2165396	1	CDS711	Dry UF	335	13	PSME	27.7	65	84	0.8543	96.5315	69.9	50	H	4

CVS Plot Num.	CVS Point Num.	Ecoclass	Potential Veg Group	Tree Num.	Veg Code	Tree Species	Tree DBH	Tree Age	Tree Height	A Value	B Value	Site Index (Feet)	Base Age	Site Tree Quality	Stream Class
2167382	3	CDS711	Dry UF	886	13	PSME	27.1	64	83	0.8622	95.5528	69.8	50	H	1
2174382	1	CDS622	Dry UF	27	13	PSME	14.0	69	64	0.8247	100.2803	50.8	50	H	4
2174382	4	CDS622	Dry UF	65	13	PSME	24.9	142	86	0.5251	134.9207	56.4	50	M	4
2183402	3	CDS634	Dry UF	605	13	PSME	10.3	44	52	1.0823	72.1355	57.8	50	H	4
2185400	3	CWS322	Dry UF	357	13	PSME	24.1	126	90	0.5706	131.4399	<u>58.3</u>	50	M	1

Mean SI (29 site trees using a base age of 50 years)

69.4 50

Dry UF PVG; Conversion of 50-year SI value (rounded to 70 feet) to a 100-year tree age by referring to published SI curves for PSME: 105 feet

CVS Plot Num.	CVS Point Num.	Ecoclass	Potential Veg Group	Tree Num.	Veg Code	Tree Species	Tree DBH	Tree Age	Tree Height	A Value	B Value	Site Index (Feet)	Base Age	Site Tree Quality	Stream Class
2149370	1	CWG112	Dry UF	706	13	PIPO	21.8	96	89	1.0148	98.4868	90.7	100	H	3
1156376	4	CWS541	Moist UF	719	13	ABGR	23.8	80	101	0.8752	115.2031	73.1	50	H	4
1160384	5	CWS541	Moist UF	739	13	ABGR	27.6	149	99	0.7036	132.1409	62.9	50	M	4
1162384	3	CWC812	Moist UF	860	13	ABGR	17.8	75	122	0.8917	111.3454	94.9	50	H	3
1164388	3	CWF421	Moist UF	625	13	ABGR	19.1	109	121	0.7920	131.1820	77.8	50	M	3
1166388	2	CWS212	Moist UF	776	13	ABGR	28.9	92	119	0.8386	123.0725	82.2	50	H	3
1168396	3	CWF421	Moist UF	284	13	ABGR	21.0	123	119	0.7573	134.9149	74.0	50	M	4
1168396	5	CWS541	Moist UF	767	13	ABGR	14.2	83	77	0.8657	117.3458	50.6	50	H	4
1172380	1	CWF312	Moist UF	769	13	ABGR	13.0	83	71	0.8657	117.3458	45.4	50	H	4
1172380	2	CWC811	Moist UF	446	13	ABGR	13.5	58	76	0.9583	94.9375	67.0	50	H	4
1172380	3	CWF421	Moist UF	452	13	ABGR	19.2	98	118	0.8216	126.3398	78.9	50	H	4
1172392	3	CWS541	Moist UF	16	13	ABGR	18.6	61	87	0.9448	98.2665	74.5	50	H	4
1176400	3	CWS812	Moist UF	85	13	ABGR	23.3	68	99	0.9167	105.2692	79.6	50	H	3
1178412	1	CWF421	Moist UF	509	13	ABGR	26.0	140	116	0.7204	134.7775	72.7	50	M	3
1178412	2	CWG211	Moist UF	520	13	ABGR	18.9	133	100	0.7348	135.5441	60.0	50	M	3
1178412	4	CWS541	Moist UF	554	13	ABGR	13.7	36	92	1.1132	63.0960	116.6	50	H	3
1178412	5	CWF512	Moist UF	557	13	ABGR	17.5	60	120	0.9492	97.1802	106.8	50	H	3
1180396	1	CWF612	Moist UF	129	13	ABGR	19.6	67	124	0.9205	104.3295	103.4	50	H	2
1180396	3	CWF611	Moist UF	195	13	ABGR	26.4	80	134	0.8752	115.2031	101.9	50	H	2
1180396	4	CWF612	Moist UF	21	13	ABGR	13.7	65	86	0.9283	102.3915	70.0	50	H	2

CVS Plot Num.	CVS Point Num.	Ecoclass	Potential Veg Group	Tree Num.	Veg Code	Tree Species	Tree DBH	Tree Age	Tree Height	A Value	B Value	Site Index (Feet)	Base Age	Site Tree Quality	Stream Class
1180412	4	CWF611	Moist UF	401	13	ABGR	19.8	137	107	0.7264	135.2368	65.6	50	M	3
1184404	2	CWS212	Moist UF	529	13	ABGR	9.1	80	56	0.8752	115.2031	33.7	50	H	4
1184404	5	CWS212	Moist UF	834	13	ABGR	8.7	47	59	1.0188	80.7574	62.7	50	H	4
2151372	1	CWF422	Moist UF	66	13	ABGR	17.7	65	98	0.9283	102.3915	81.2	50	H	3
2151372	2	CWF422	Moist UF	95	13	ABGR	18.4	73	127	0.8986	109.6944	100.9	50	H	3
2151372	4	CWF421	Moist UF	316	13	ABGR	17.4	123	82	0.7573	134.9149	45.9	50	M	3
2153376	1	CES315	Moist UF	478	13	ABGR	22.0	84	97	0.8626	118.0330	67.4	50	H	3
2153376	2	CES315	Moist UF	89	13	ABGR	26.0	125	99	0.7527	135.1899	58.8	50	M	3
2153376	4	CEF311	Moist UF	436	13	ABGR	25.8	88	110	0.8504	120.6526	76.5	50	H	3
2156378	1	CWF312	Moist UF	461	13	ABGR	18.2	58	89	0.9583	94.9375	79.4	50	H	3
2156378	2	CWF312	Moist UF	468	13	ABGR	18.4	76	104	0.8883	112.1470	78.2	50	H	3
2156378	4	CWF421	Moist UF	122	13	ABGR	14.3	54	77	0.9779	90.1569	72.2	50	H	3
2156378	5	CWF312	Moist UF	145	13	ABGR	18.4	66	107	0.9243	103.3704	88.6	50	H	
2157376	2	CWF421	Moist UF	548	13	ABGR	13.3	64	72	0.9323	101.3922	57.8	50	H	1
2157376	4	CWF421	Moist UF	365	13	ABGR	18.1	73	113	0.8986	109.6944	88.4	50	H	4
2158370	2	CWS412	Moist UF	485	13	ABGR	21.3	102	88	0.8106	128.2764	53.1	50	H	4
2158370	3	CWS211	Moist UF	487	13	ABGR	28.6	104	112	0.8052	129.1707	72.0	50	H	4
2158370	4	CWF421	Moist UF	137	13	ABGR	18.3	149	95	0.7036	132.1409	60.1	50	M	4
2160370	1	CWS412	Moist UF	951	13	ABGR	25.0	91	143	0.8416	122.4859	102.9	50	H	3
2160370	3	CWF421	Moist UF	755	13	ABGR	19.4	85	111	0.8595	118.7071	78.9	50	H	3
2160370	4	CWF421	Moist UF	793	13	ABGR	21.7	61	115	0.9448	98.2665	101.0	50	H	3
2160382	5	CWF421	Moist UF	418	13	ABGR	23.7	99	136	0.8188	126.8422	93.2	50	H	3
2161386	3	CWF421	Moist UF	984	13	ABGR	9.2	30	39	1.1951	52.0341	68.5	50	H	3
2164378	1	CWF421	Moist UF	882	13	ABGR	16.1	102	108	0.8106	128.2764	69.3	50	H	4
2164394	1	CWF421	Moist UF	435	13	ABGR	29.1	106	127	0.7999	130.0143	83.4	50	H	3
2164394	4	CWF421	Moist UF	475	13	ABGR	23.5	85	137	0.8595	118.7071	101.3	50	H	3
2164394	5	CWF421	Moist UF	218	13	ABGR	29.1	80	129	0.8752	115.2031	97.6	50	H	3
2167386	4	CES311	Moist UF	879	13	ABGR	19.5	87	100	0.8534	120.0167	68.5	50	H	2
2167388	1	CES131	Moist UF	555	13	ABGR	18.2	93	105	0.8358	123.6471	70.1	50	H	3
2167388	2	CWF421	Moist UF	517	13	ABGR	13.1	53	91	0.9832	88.8971	87.1	50	H	3
2167388	3	CES131	Moist UF	528	13	ABGR	29.7	89	128	0.8474	121.2760	91.3	50	H	3

CVS Plot Num.	CVS Point Num.	Ecoclass	Potential Veg Group	Tree Num.	Veg Code	Tree Species	Tree DBH	Tree Age	Tree Height	A Value	B Value	Site Index (Feet)	Base Age	Site Tree Quality	Stream Class
2167388	5	CES131	Moist UF	100	13	ABGR	19.3	71	115	0.9056	107.9771	91.7	50	H	3
2167390	1	CES131	Moist UF	486	13	ABGR	21.1	65	112	0.9283	102.3915	94.2	50	H	3
2167390	2	CES315	Moist UF	632	13	ABGR	23.5	56	101	0.9678	92.5979	93.2	50	H	3
2169378	2	CWF422	Moist UF	810	13	ABGR	30.1	144	142	0.7126	133.8449	92.0	50	M	1
2169378	4	CWF422	Moist UF	847	13	ABGR	8.4	38	61	1.0920	66.5719	78.4	50	H	1
2169396	1	CES131	Moist UF	408	13	ABGR	17.4	62	97	0.9406	99.3302	83.0	50	H	4
2169396	5	CES315	Moist UF	453	13	ABGR	13.8	73	75	0.8986	109.6944	54.2	50	H	4
2169400	2	CWF421	Moist UF	25	13	ABGR	20.7	74	117	0.8951	110.5280	91.2	50	H	3
2170378	5	CWF422	Moist UF	618	13	ABGR	25.8	68	121	0.9167	105.2692	99.7	50	H	4
2171404	2	CWF421	Moist UF	489	13	ABGR	26.2	80	117	0.8752	115.2031	87.1	50	H	4
2173384	1	CWF421	Moist UF	61	13	ABGR	18.2	66	116	0.9243	103.3704	96.9	50	H	4
2175382	1	CWF421	Moist UF	467	13	ABGR	30.4	148	134	0.7053	132.5308	87.3	50	M	3
2175382	4	CWF421	Moist UF	513	13	ABGR	17.9	134	96	0.7327	135.4990	57.2	50	M	3
2175382	5	CWF421	Moist UF	529	13	ABGR	29.6	115	135	0.7767	133.1460	87.4	50	M	3
2177390	2	CWS211	Moist UF	913	13	ABGR	24.2	88	110	0.8504	120.6526	76.5	50	H	4
2178418	5	CWS412	Moist UF	775	13	ABGR	23.9	134	111	0.7327	135.4990	68.2	50	M	3
2179388	2	CWF421	Moist UF	982	13	ABGR	24.1	104	117	0.8052	129.1707	76.0	50	H	1
2179388	4	CWF421	Moist UF	760	13	ABGR	24.0	124	118	0.7550	135.0612	73.2	50	M	1
2179388	5	CWF421	Moist UF	986	13	ABGR	27.1	102	122	0.8106	128.2764	80.7	50	H	1
2179404	1	CES311	Moist UF	815	13	ABGR	25.4	53	140	0.9832	88.8971	135.2	50	H	3
2179404	5	CES314	Moist UF	894	13	ABGR	18.9	53	119	0.9832	88.8971	114.6	50	H	3
2180406	3	CWF311	Moist UF	845	13	ABGR	17.9	142	91	0.7165	134.3579	55.1	50	M	4
2180410	5	CWF422	Moist UF	803	13	ABGR	24.8	150	153	0.7018	131.7262	101.2	50	M	3
2180414	1	CWS211	Moist UF	259	13	ABGR	9.5	84	75	0.8626	118.0330	48.4	50	H	4
2181396	2	CWF311	Moist UF	236	13	ABGR	19.4	67	110	0.9205	104.3295	90.5	50	M	4
2181410	2	CWF422	Moist UF	815	13	ABGR	16.7	128	88	0.7458	135.4667	50.7	50	H	4
2185400	4	CWS541	Moist UF	358	13	ABGR	14.2	24	71	1.3221	40.2492	124.1	50	H	1
2168394	3	CES315	Moist UF	266	13	ABLA2	13.0	58	75			67.3	50	H	4
2179414	1	CES315	Moist UF	161	13	ABLA2	14.3	78	84			63.3	50	H	4
1152376	3	CWS212	Moist UF	106	13	LAOC	22.5	124	153	0.8281	130.5059	93.0	50	M	3
1168388	4	CWC811	Moist UF	264	13	LAOC	16.9	66	101	0.8933	89.4585	84.4	50	H	4

CVS Plot Num.	CVS Point Num.	Ecoclass	Potential Veg Group	Tree Num.	Veg Code	Tree Species	Tree DBH	Tree Age	Tree Height	A Value	B Value	Site Index (Feet)	Base Age	Site Tree Quality	Stream Class
2153370	2	CWF422	Moist UF	874	13	LAOC	13.0	70	103	0.8736	92.6677	83.2	50	H	1
2153370	3	CWF422	Moist UF	824	13	LAOC	14.0	76	100	0.8439	96.9900	76.8	50	H	1
2156378	3	CWF421	Moist UF	103	13	LAOC	18.6	78	124	0.8337	98.3157	95.7	50	H	3
2167388	4	CES131	Moist UF	64	13	LAOC	22.3	87	123	0.7858	103.7480	89.7	50	H	3
2167390	3	CWS211	Moist UF	245	13	LAOC	23.4	65	122	0.8984	88.6115	104.0	50	H	3
2167390	4	CES131	Moist UF	272	13	LAOC	17.9	80	113	0.8234	99.5917	85.4	50	H	4
1154376	1	CES311	Moist UF	83	13	PIEN	31.6	102	127			83.9	50	H	4
1154376	2	CEF331	Moist UF	89	13	PIEN	21.8	95	100			69.5	50	H	4
1154376	4	CES311	Moist UF	375	13	PIEN	25.3	92	102			71.7	50	H	4
2152370	2	CWF422	Moist UF	941	13	PIEN	13.3	66	81			66.9	50	H	4
2153376	5	CES315	Moist UF	67	13	PIEN	28.0	113	127			81.5	50	H	3
2156370	3	CES131	Moist UF	289	13	PIEN	25.0	88	115			81.5	50	H	3
2156370	5	CEF311	Moist UF	764	13	PIEN	21.9	95	125			84.9	50	H	3
2157370	2	CWF421	Moist UF	278	13	PIEN	24.2	67	125			100.9	50	H	4
2160382	2	CWF421	Moist UF	131	13	PIEN	19.5	104	96			64.7	50	H	3
2161380	2	CES131	Moist UF	704	13	PIEN	26.6	92	118			81.9	50	H	4
2164394	3	CWF421	Moist UF	463	13	PIEN	22.5	65	106			88.3	50	H	3
2168394	1	CES131	Moist UF	201	13	PIEN	25.1	79	117			86.8	50	H	4
2168394	5	CES131	Moist UF	315	13	PIEN	22.1	71	98			77.8	50	H	4
2169378	1	CWF421	Moist UF	7	13	PIEN	14.2	58	72			64.5	50	H	1
2169396	4	CES131	Moist UF	427	13	PIEN	23.4	63	103			87.6	50	H	4
2178410	2	CES315	Moist UF	473	13	PIEN	21.8	94	81			55.8	50	H	4
2179404	2	CES314	Moist UF	520	13	PIEN	18.7	76	115			87.2	50	H	3
2179414	2	CES315	Moist UF	170	13	PIEN	16.2	67	103			84.4	50	H	4
2179414	3	CES315	Moist UF	171	13	PIEN	17.2	89	105			74.7	50	H	4
2179418	1	CES131	Moist UF	995	13	PIEN	19.1	147	118			72.5	50	H	3
2181410	5	CWF422	Moist UF	949	13	PIEN	22.5	165	121			72.8	50	H	4
2182402	5	CEF221	Moist UF	926	13	PIEN	14.2	81	71			51.6	50	H	4
1150368	4	CWF312	Moist UF	671	13	PSME	27.9	128	98	0.5646	131.9683	62.8	50	M	2
1158368	1	CWS541	Moist UF	48	13	PSME	12.9	47	65	1.0388	76.1445	68.2	50	H	3
1170388	5	CDS611	Moist UF	121	13	PSME	17.9	75	68	0.7851	105.4282	51.6	50	H	4

CVS Plot Num.	CVS Point Num.	Ecoclass	Potential Veg Group	Tree Num.	Veg Code	Tree Species	Tree DBH	Tree Age	Tree Height	A Value	B Value	Site Index (Feet)	Base Age	Site Tree Quality	Stream Class
1172392	1	CDS611	Moist UF	300	13	PSME	23.5	84	103	0.7343	112.1651	74.4	50	H	4
1172392	4	CDS611	Moist UF	25	13	PSME	15.7	78	94	0.7672	107.7999	70.4	50	H	4
1174388	4	CWC811	Moist UF	701	13	PSME	22.0	75	90	0.7851	105.4282	68.8	50	H	4
1180396	2	CWC812	Moist UF	173	13	PSME	18.5	96	132	0.6778	119.5188	89.9	50	H	2
1180396	5	CWS541	Moist UF	29	13	PSME	15.9	118	99	0.5958	129.0277	63.9	50	M	2
1180416	4	CDS722	Moist UF	738	13	PSME	19.7	71	88	0.8109	102.0581	69.4	50	H	3
2149370	2	CDS722	Moist UF	713	13	PSME	16.3	100	85	0.6612	121.6016	57.3	50	H	3
2151370	1	CDS722	Moist UF	816	13	PSME	18.8	104	94	0.6454	123.5168	62.5	50	H	4
2151372	3	CWF422	Moist UF	83	13	PSME	17.8	75	88	0.7851	105.4282	67.3	50	H	3
2151372	5	CWF421	Moist UF	346	13	PSME	13.5	71	88	0.8109	102.0581	69.4	50	H	3
2152374	2	CWS212	Moist UF	567	13	PSME	19.4	133	98	0.5500	133.1678	62.7	50	M	4
2153370	1	CWF421	Moist UF	856	13	PSME	14.1	83	91	0.7395	111.4714	66.0	50	H	1
2154366	2	CDS722	Moist UF	915	13	PSME	21.9	82	72	0.7448	110.7644	52.2	50	H	4
2154366	3	CDS722	Moist UF	494	13	PSME	18.7	89	71	0.7094	115.4411	49.7	50	H	4
2154370	2	CDS722	Moist UF	299	13	PSME	15.9	48	60	1.0254	77.4400	62.0	50	H	
2156362	3	CDS722	Moist UF	262	13	PSME	15.6	82	81	0.7448	110.7644	58.9	50	H	4
2156366	1	CWF421	Moist UF	819	13	PSME	17.7	85	82	0.7291	112.8458	58.7	50	H	1
2156366	4	CWF421	Moist UF	866	13	PSME	17.1	86	89	0.7241	113.5135	63.5	50	H	1
2157376	3	CWF421	Moist UF	385	13	PSME	15.3	70	95	0.8177	101.1771	75.7	50	H	1
2158370	1	CWS412	Moist UF	500	13	PSME	13.1	52	58	0.9764	82.4221	56.2	50	H	4
2159370	2	CDS722	Moist UF	736	13	PSME	17.6	99	103	0.6653	121.0970	69.4	50	H	4
2160366	2	CDS722	Moist UF	886	13	PSME	13.6	111	73	0.6197	126.4922	48.5	50	M	4
2161372	2	CDS611	Moist UF	560	13	PSME	27.4	126	110	0.5706	131.4399	69.7	50	M	1
2161372	5	CWS541	Moist UF	719	13	PSME	31.4	105	102	0.6416	123.9704	67.5	50	M	1
2161386	4	CWF421	Moist UF	813	13	PSME	23.9	124	102	0.5767	130.8825	65.2	50	M	
2161386	5	CWS412	Moist UF	827	13	PSME	17.4	73	84	0.7977	103.7735	65.1	50	H	3
2163380	5	CWS541	Moist UF	944	13	PSME	14.3	41	61	1.1316	67.9398	71.5	50	H	3
2164378	3	CWF421	Moist UF	963	13	PSME	20.2	104	108	0.6454	123.5168	71.6	50	H	4
2165396	2	CDS722	Moist UF	342	13	PSME	20.0	67	81	0.8391	98.4387	66.1	50	H	4
2167380	4	CDS722	Moist UF	690	13	PSME	15.0	68	77	0.8318	99.3676	62.1	50	H	4
2169378	3	CWF422	Moist UF	818	13	PSME	14.1	57	83	0.9238	88.2138	75.5	50	H	1

CVS Plot Num.	CVS Point Num.	Ecoclass	Potential Veg Group	Tree Num.	Veg Code	Tree Species	Tree DBH	Tree Age	Tree Height	A Value	B Value	Site Index (Feet)	Base Age	Site Tree Quality	Stream Class
2169378	5	CWF422	Moist UF	858	13	PSME	13.4	53	62	0.9652	83.6186	59.3	50	H	1
2170378	1	CDS722	Moist UF	176	13	PSME	15.7	52	71	0.9764	82.4221	68.9	50	H	4
2170378	4	CWF421	Moist UF	165	13	PSME	20.3	62	90	0.8786	93.5441	77.4	50	H	4
2173384	2	CWF421	Moist UF	74	13	PSME	24.1	76	93	0.7790	106.2333	70.7	50	H	4
2174382	3	CWS412	Moist UF	463	13	PSME	21.2	108	95	0.6304	125.2734	62.5	50	M	4
2178414	3	CDS722	Moist UF	249	13	PSME	17.7	92	94	0.6955	117.2587	65.2	50	H	4
2178414	4	CDS722	Moist UF	451	13	PSME	14.2	56	77	0.9336	87.0932	70.8	50	H	4
2178418	4	CWS412	Moist UF	795	13	PSME	16.6	68	80	0.8318	99.3676	64.6	50	H	3
2154370	1	SM30	Moist US	696	13	PSME	17.3	125	69	0.5737	131.1649	<u>46.2</u>	50	M	

Mean Site Index (152 site trees using a base age of 50 years)

75.5 50

Moist UF PVG; Conversion of 50-year SI value (rounded to 80 feet) to a 100-year tree age by referring to published SI curves for ABGR: **120 feet**

2179414	5	CES315	Moist UF	969	13	PICO	13.1	76	80	72.9972	1.0077	86.3	90	H	4
2161386	1	CWF421	Moist UF	795	13	PIPO	28.0	122	136	0.9225	109.1511	125.5	100	H	
2161386	2	CWF421	Moist UF	783	13	PIPO	17.2	71	98	1.1166	83.0897	<u>116.6</u>	100	H	3

Mean Site Index (no conversion made because base age is already close to 100 years)

109.5

Sources/Notes: CVS Plot and Point Numbers refer to plot and point identifiers from a CVS database (USDA Forest Service 1995). Ecoclass codes are used to record potential vegetation types (plant associations, plant community types, plant communities) on field forms and in computer databases; Ecoclass codes are taken primarily from Johnson and Clausnitzer (1992). Potential Vegetation Group (PVG) is a mid-scale hierarchical unit of potential vegetation; each Ecoclass code is assigned to a PVG by following a protocol provided in Powell et al. (2007) (and see appendix 1). Tree Number was taken from a CVS database. Vegetation Code came from a CVS database; code 13 refers to site trees. Tree Species is an alphanumeric code that came from a CVS database; table 1 provides a tree species common name for each code. Tree DBH is diameter at breast height, defined as a measurement point 4½ feet above ground level on the uphill side of a tree. Tree Age is a breast-height age determined by extracting an increment core at DBH and then counting growth rings from outside (cambium layer near the bark) to tree center (pith). Tree height is a measured total height, from base of a tree (at the ground surface) to the top. An A Value is an intermediate calculation used by some site index equations. A B Value is an intermediate calculation used by some site index equations. Site Index (Feet) is a calculated value of site index by using an equation referencing tree age and tree height as input variables. Base Age column shows base age used by the site index curve being used to calculate a site index value. Site Tree Quality is a subjective judgment of site tree quality by referring to Age Limit recommendations from table 1, and the measured Tree Age value for a site tree (H is High, M is Moderate, L is Low); site trees with low site quality had measured tree ages exceeding recommended amounts (from Table 1) by a considerable amount. Stream class came from the Forest's stream layer in GIS.

Table 3: CVS site trees not used in a site potential tree height analysis, or CVS plots and points without site tree information.

CVS Plot Num.	CVS Point Num.	Ecoclass	Potential Veg Group	Tree Num.	Veg Code	Tree Species	Tree DBH	Tree Age	Tree Height	A Value	B Value	Site Index (Feet)	Base Age	Site Tree Quality	Stream Class
1158368	4	CWC812	Moist UF	64	13	ABGR	29.2	235	144	0.7167	33.9111	165.1	50	L	3
1180412	3	CWF312	Moist UF	856	13	ABGR	18	157	80	0.6905	128.1129	53.1	50	L	3
2157370	3	CWF421	Moist UF	298	13	ABGR	25.8	240	120	0.7336	28.5656	153.2	50	L	4
2157374	3	CWF422	Moist UF	526	13	ABGR	17.8	164	100	0.6808	123.2399	70.5	50	L	2
2180410	2	CWF422	Moist UF	756	13	ABGR	25.9	156	134	0.6921	128.7059	90.0	50	L	3
2171404	1	CWF421	Moist UF	467	13	LAOC	15.7	154	103	2.4309	196.0963	-159.2	50	L	4
1168396	1	CWS541	Moist UF	728	13	PSME	26.9	165	142	0.4680	137.4042	84.5	50	L	4
2158370	5	SM1111	Moist US	58	13	PSME	20.6	198	89	0.3969	137.2628	63.5	50	L	4
1150368	1	CDG111	Dry UF												2
1152364	3	CDG111	Dry UF												4
1152364	5	CDS624	Dry UF												1
1152376	4	CWS541	Moist UF												3
1156376	1	GB41	Dry UH												4
1158368	3	CWC812	Moist UF												3
1158368	5	CWS541	Moist UF												3
1158372	1	CDS624	Dry UF												4
1158372	4	CDG111	Dry UF												4
1158372	5	CWS541	Moist UF												4
1160384	1	CWS541	Moist UF												4
1160384	3	SM31	Moist US												4
1162372	3	CDS624	Dry UF												4
1164388	1	CWC811	Moist UF												3
1166392	1	CWG111	Dry UF												4
1168388	1	CWC811	Moist UF												4
1168388	2	CWC812	Moist UF												4
1168388	5	CWC812	Moist UF												4
1168396	2	CWS541	Moist UF												4
1170388	4	CWS541	Moist UF												4
1174384	4	CDS711	Dry UF												4

CVS Plot Num.	CVS Point Num.	Ecoclass	Potential Veg Group	Tree Num.	Veg Code	Tree Species	Tree DBH	Tree Age	Tree Height	A Value	B Value	Site Index (Feet)	Base Age	Site Tree Quality	Stream Class
1182392	2	CPG222	Dry UF												4
1182392	5	CPG111	Dry UF												4
2149370	3	CWS211	Moist UF												3
2151368	1	CWF311	Moist UF												1
2151368	2	CDS722	Moist UF												1
2151368	3	CDS722	Moist UF												1
2151368	4	CWF311	Moist UF												1
2151368	5	CWF311	Moist UF												1
2153368	2	NR													3
2153368	3	CDS711	Dry UF												3
2154370	3	SM31	Moist US												
2154370	4	SD9111	Dry US												
2155370	2	CWF421	Moist UF												3
2155374	2	CDS722	Moist UF												4
2156362	5	CDS722	Moist UF												4
2156366	3	CWF421	Moist UF												1
2156370	1	CEF311	Moist UF												3
2156370	4	CEF311	Moist UF												3
2157372	5	CWS412	Moist UF												4
2157376	1	CWF421	Moist UF												4
2158366	5	GB41	Dry UH												4
2158374	3	CDS711	Dry UF												4
2159366	1	CDS711	Dry UF												4
2159366	2	CDS711	Dry UF												4
2159370	3	CDS711	Dry UF												4
2160366	5	CDS711	Dry UF												4
2160370	5	CDS711	Dry UF												3
2161372	1	CDS611	Moist UF												1
2161372	4	WR													1
2163382	5	SM30	Moist US												4
2165378	1	SM30	Moist US												2

CVS Plot Num.	CVS Point Num.	Ecoclass	Potential Veg Group	Tree Num.	Veg Code	Tree Species	Tree DBH	Tree Age	Tree Height	A Value	B Value	Site Index (Feet)	Base Age	Site Tree Quality	Stream Class
2165378	2	SM30	Moist US												2
2165378	3	GB59	Moist UH												2
2165378	4	SM30	Moist US												2
2165378	5	SM30	Moist US												2
2165396	5	SM1111	Moist US												4
2166394	1	CWS212	Moist UF												4
2166394	2	CWG211	Moist UF												4
2166394	3	CWG211	Moist UF												4
2166394	5	CWS541	Moist UF												4
2167386	1	CEF331	Moist UF												2
2167386	5	SD93	Dry UH												2
2167396	2	NRCO													4
2167396	3	CPS523	Dry UF												4
2168378	4	CWF421	Moist UF												4
2169382	4	SM20	Cold US												4
2169396	3	CES131	Moist UF												4
2169400	5	CWF311	Moist UF												3
2171404	5	CWF311	Moist UF												4
2173380	1	GB41	Dry UH												4
2173380	4	GB41	Dry UH												4
2173380	5	CPG111	Dry UF												4
2173384	5	CWF421	Moist UF												4
2176390	2	CWS211	Moist UF												4
2176390	3	CWS211	Moist UF												4
2178410	5	CES315	Moist UF												4
2179388	1	CWF421	Moist UF												1
2179388	3	CWF421	Moist UF												1
2179418	3	CWF311	Moist UF												3
2179418	4	CWF311	Moist UF												3
2180410	1	CWF422	Moist UF												3
2180414	3	CWF311	Moist UF												4

CVS Plot Num.	CVS Point Num.	Ecoclass	Potential Veg Group	Tree Num.	Veg Code	Tree Species	Tree DBH	Tree Age	Tree Height	A Value	B Value	Site Index (Feet)	Base Age	Site Tree Quality	Stream Class
2180414	4	CWS211	Moist UF												4
2183410	4	CDS722	Moist UF												3
2185400	2	NOSPNT													1

Sources/Notes: See footnotes for table 2 for a description of column headings. First 8 records in this table show site trees that were not used for analysis because their quality was deemed to be too low (see table 2 for more information about the site tree quality rating). Balance of this table shows CVS plots and points for which measured site tree information was unavailable.

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Appendix 1: Potential vegetation types (PVT) of the Blue Mountains section (from Powell et al. 2007)¹

PVT CODE	PVT COMMON NAME	STATUS	ECOCLASS	PAG	PVG
ABGR/ACGL	grand fir/Rocky Mountain maple	PA	CWS912	Warm Very Moist UF	Moist UF
ABGR/ACGL (FLOODPLAIN)	grand fir/Rocky Mountain maple (floodplain)	PA	CWS543	Warm Moderate SM RF	Moderate SM RF
ABGR/ACGL-PHMA	grand fir/Rocky Mountain maple-ninebark	PCT	CWS412	Warm Moist UF	Moist UF
ABGR/ARCO	grand fir/heartleaf arnica	PCT	CWF444	Cold Dry UF	Cold UF
ABGR/ATFI	grand fir/ladyfern	PA	CWF613	Warm High SM RF	High SM RF
ABGR/BRVU	grand fir/Columbia brome	PA	CWG211	Warm Moist UF	Moist UF
ABGR/CAGE	grand fir/elk sedge	PA	CWG111	Warm Dry UF	Dry UF
ABGR/CALA3	grand fir/woolly sedge	PC	CWM311	Warm High SM RF	High SM RF
ABGR/CARU	grand fir/pinegrass	PA	CWG112	Warm Dry UF	Dry UF
ABGR/CLUN	grand fir/queencup beadlily	PA	CWF421	Cool Moist UF	Moist UF
ABGR/COOC2	grand fir/goldthread	PA	CWF511	Cool Dry UF	Cold UF
ABGR/GYDR	grand fir/oakfern	PA	CWF611	Cool Very Moist UF	Moist UF
ABGR/LIBO2	grand fir/twinflower	PA	CWF311	Cool Moist UF	Moist UF
ABGR/POMU-ASCA3	grand fir/sword fern-ginger	PA	CWF612	Cool Very Moist UF	Moist UF
ABGR/SPBE	grand fir/birchleaf spiraea	PA	CWS321	Warm Dry UF	Dry UF
ABGR/SYAL (FLOODPLAIN)	grand fir/common snowberry (floodplain)	PCT	CWS314	Warm Low SM RF	Low SM RF
ABGR/TABR/CLUN	grand fir/Pacific yew/queencup beadlily	PA	CWC811	Cool Wet UF	Moist UF
ABGR/TABR/LIBO2	grand fir/Pacific yew/twinflower	PA	CWC812	Cool Wet UF	Moist UF
ABGR/TRCA3	grand fir/false bugbane	PA	CWF512	Cool Very Moist UF	Moist UF
ABGR/VAME	grand fir/big huckleberry	PA	CWS211	Cool Moist UF	Moist UF
ABGR/VASC	grand fir/grouse huckleberry	PA	CWS811	Cold Dry UF	Cold UF
ABGR/VASC-LIBO2	grand fir/grouse huckleberry-twinflower	PA	CWS812	Cool Moist UF	Moist UF
ABGR-CHNO/VAME	grand fir-Alaska yellow cedar/big huckleberry	PCT	CWS232	Cool Moist UF	Moist UF
ABLA2/ARCO	subalpine fir/heartleaf arnica	PCT	CEF412	Cool Moist UF	Moist UF
ABLA2/ATFI	subalpine fir/ladyfern	PA	CEF332	Cold High SM RF	High SM RF
ABLA2/CAAQ	subalpine fir/aquatic sedge	PCT	CEM123	Cold High SM RF	High SM RF
ABLA2/CACA	subalpine fir/bluejoint reedgrass	PA	CEM124	Cold Moderate SM RF	Moderate SM RF
ABLA2/CADI	subalpine fir/softleaved sedge	PCT	CEM122	Cold High SM RF	High SM RF
ABLA2/CAGE	subalpine fir/elk sedge	PA	CAG111	Cold Dry UF	Cold UF
ABLA2/CARU	subalpine fir/pinegrass	PCT	CEG312	Cool Dry UF	Cold UF
ABLA2/CLUN	subalpine fir/queencup beadlily	PA	CES131	Cool Moist UF	Moist UF
ABLA2/LIBO2	subalpine fir/twinflower	PA	CES414	Cool Moist UF	Moist UF
ABLA2/MEFE	subalpine fir/fool's huckleberry	PA	CES221	Cold Moist UF	Cold UF
ABLA2/POPU	subalpine fir/skunkleaved polemonium	PCT	CEF411	Cold Dry UF	Cold UF
ABLA2/RHAL	subalpine fir/white rhododendron	PCT	CES214	Cold Moist UF	Cold UF
ABLA2/SETR	subalpine fir/arrowleaf groundsel	PA	CEF333	Cold High SM RF	High SM RF
ABLA2/STAM	subalpine fir/twisted stalk	PCT	CEF311	Cool Wet UF	Moist UF
ABLA2/STOC	subalpine fir/western needlegrass	PCT	CAG4	Cold Dry UF	Cold UF
ABLA2/TRCA3	subalpine fir/false bugbane	PA	CEF331	Cool Moist UF	Moist UF

PVT CODE	PVT COMMON NAME	STATUS	ECOCCLASS	PAG	PVG
ABLA2/VAME	subalpine fir/big huckleberry	PA	CES311	Cool Moist UF	Moist UF
ABLA2/VASC	subalpine fir/grouse huckleberry	PA	CES411	Cold Dry UF	Cold UF
ABLA2/VASC/POPU	subalpine fir/grouse huckleberry/skunkleaved polemonium	PA	CES415	Cold Dry UF	Cold UF
ABLA2/VAUL/CASC5	subalpine fir/bog blueberry/Holm's sedge	PCT	CEM313	Cold High SM RF	High SM RF
ABLA2-PIAL/JUDR	subalpine fir-whitebark pine/Drummond's rush	PCT	CAG3	Cold Dry UF	Cold UF
ABLA2-PIAL/POPH	subalpine fir-whitebark pine/fleeceflower	PCT	CAF2	Cold Dry UF	Cold UF
ABLA2-PIAL/POPU	subalpine fir-whitebark pine/skunkleaved polemonium	PCT	CAF0	Cold Dry UF	Cold UF
ADPE	maidenhair fern	PCT	FW4213	Warm High SM RH	High SM RH
AGDI	thin bentgrass	PCT	MD4111	Warm Low SM RH	Low SM RH
AGSP	bluebunch wheatgrass	PA	GB41	Hot Dry UH	Dry UH
AGSP-ERHE	bluebunch wheatgrass-Wyeth's buckwheat	PA	GB4111	Hot Dry UH	Dry UH
AGSP-POSA3	bluebunch wheatgrass-Sandberg's bluegrass	PA	GB4121	Hot Dry UH	Dry UH
AGSP-POSA3-ASCU4	bluebunch wheatgrass-Sandberg's bluegrass-Cusick's milkvetch	PA	GB4114	Hot Dry UH	Dry UH
AGSP-POSA3 (BASALT)	bluebunch wheatgrass-Sandberg's bluegrass (basalt)	PA	GB4113	Hot Dry UH	Dry UH
AGSP-POSA3-DAUN	bluebunch wheatgrass-Sandberg's bluegrass-onespike oatgrass	PA	GB4911	Hot Dry UH	Dry UH
AGSP-POSA3-ERPU	bluebunch wheatgrass-Sandberg's bluegrass-shaggy fleabane	PA	GB4115	Hot Dry UH	Dry UH
AGSP-POSA3 (GRANITE)	bluebunch wheatgrass-Sandberg's bluegrass (granite)	PA	GB4116	Hot Dry UH	Dry UH
AGSP-POSA3-OPPO	bluebunch wheatgrass-Sandberg's bluegrass-pricklypear	PA	GB4118	Hot Dry UH	Dry UH
AGSP-POSA3-PHCO2	bluebunch wheatgrass-Sandberg's bluegrass-Snake River phlox	PA	GB4117	Hot Dry UH	Dry UH
AGSP-POSA3-SCAN	bluebunch wheatgrass-Sandberg's bluegrass-narrowleaf skullcap	PA	GB4112	Hot Dry UH	Dry UH
AGSP-SPCR-ARLO3	bluebunch wheatgrass-sand dropseed-red threeawn	PCT	GB1911	Hot Dry UH	Dry UH
ALIN/ATFI	mountain alder/ladyfern	PA	SW2116	Warm High SM RS	High SM RS
ALIN/CAAM	mountain alder/bigleaved sedge	PA	SW2114	Warm High SM RS	High SM RS
ALIN/CAAQ	mountain alder/aquatic sedge	PC	SW2126	Warm High SM RS	High SM RS
ALIN/CACA	mountain alder/bluejoint reedgrass	PA	SW2121	Warm Moderate SM RS	Moderate SM RS
ALIN/CADE	mountain alder/Dewey's sedge	PCT	SW2118	Warm Moderate SM RS	Moderate SM RS
ALIN/CALA3	mountain alder/woolly sedge	PA	SW2123	Warm Moderate SM RS	Moderate SM RS
ALIN/CALEL2	mountain alder/densely tufted sedge	PC	SW2127	Warm Moderate SM RS	Moderate SM RS
ALIN/CALU	mountain alder/woodrush sedge	PC	SW2128	Warm Low SM RS	Low SM RS
ALIN/CAUT	mountain alder/bladder sedge	PA	SW2115	Warm High SM RS	High SM RS
ALIN/EQAR	mountain alder/common horsetail	PA	SW2117	Warm Moderate SM RS	Moderate SM RS
ALIN/GLEL	mountain alder/tall mannagrass	PA	SW2215	Warm High SM RS	High SM RS
ALIN/GYDR	mountain alder/oakfern	PCT	SW2125	Warm Moderate SM RS	Moderate SM RS
ALIN/HELA	mountain alder/common cowparsnip	PCT	SW2124	Warm Moderate SM RS	Moderate SM RS
ALIN/POPR	mountain alder/Kentucky bluegrass	PCT	SW2120	Warm Low SM RS	Low SM RS
ALIN/SCMI	mountain alder/smallfruit bulrush	PCT	SW2122	Warm High SM RS	High SM RS
ALIN-COST/MESIC FORB	mountain alder-redosier dogwood/mesic forb	PA	SW2216	Warm Moderate SM RS	Moderate SM RS
ALIN-RIBES/MESIC FORB	mountain alder-currants/mesic forb	PA	SW2217	Warm Moderate SM RS	Moderate SM RS
ALIN-SYAL	mountain alder-common snowberry	PA	SW2211	Warm Low SM RS	Low SM RS
ALPR	meadow foxtail	PCT	MD2111	Warm Low SM RH	Low SM RH

PVT CODE	PVT COMMON NAME	STATUS	ECOCLASS	PAG	PVG
ALRU (ALLUVIAL BAR)	red alder (alluvial bar)	PCT	HAF226	Warm Moderate SM RF	Moderate SM RF
ALRU/ATFI	red alder/ladyfern	PCT	HAF227	Warm High SM RF	High SM RF
ALRU/COST	red alder/redosier dogwood	PC	HAS511	Warm Moderate SM RF	Moderate SM RF
ALRU/PEFRP	red alder/sweet coltsfoot	PCT	HAF211	Warm Moderate SM RF	Moderate SM RF
ALRU/PHCA3	red alder/Pacific ninebark	PA	HAS211	Warm Moderate SM RF	Moderate SM RF
ALRU/SYAL	red alder/common snowberry	PCT	HAS312	Warm Moderate SM RF	Moderate SM RF
ALSI	Sitka alder snow slides	PCT	SM20	Cold Very Moist US	Cold US
ALSI/ATFI	Sitka alder/ladyfern	PA	SW2111	Warm High SM RS	High SM RS
ALSI/CILA2	Sitka alder/drooping woodreed	PA	SW2112	Warm High SM RS	High SM RS
ALSI/MESIC FORB	Sitka alder/mesic forb	PCT	SW2113	Warm Moderate SM RS	Moderate SM RS
ALVA	swamp onion	PCT	FW7111	Cold High SM RH	High SM RH
AMAL	western serviceberry	PCT	SW3114	Hot Low SM RS	Low SM RS
ARAR/FEID-AGSP	low sagebrush/Idaho fescue-bluebunch wheatgrass	PA	SD1911	Warm Moist US	Moist US
ARAR/POSA3	low sagebrush/Sandberg's bluegrass	PA	SD9221	Hot Dry US	Dry US
ARCA/DECE	silver sagebrush/tufted hairgrass	PA	SW6111	Hot Moderate SM RS	Moderate SM RS
ARCA/POCU	silver sagebrush/Cusick's bluegrass	PCT	SW6114	Hot Low SM RS	Low SM RS
ARCA/POPR	silver sagebrush/Kentucky bluegrass	PCT	SW6112	Hot Low SM RS	Low SM RS
ARRI/POSA3	stiff sagebrush/Sandberg's bluegrass	PCT	SD9111	Hot Dry US	Dry US
ARTRV/BRCA	mountain big sagebrush/mountain brome	PCT	SS4914	Warm Moist US	Moist US
ARTRV/CAGE	mountain big sagebrush/elk sedge	PA	SS4911	Cold Moist US	Cold US
ARTRV/FEID-AGSP	mountain big sagebrush/Idaho fescue-bluebunch wheatgrass	PA	SD2911	Warm Moist US	Moist US
ARTRV/POCU	mountain big sagebrush/Cusick's bluegrass	PA	SW6113	Hot Low SM RS	Low SM RS
ARTRV/STOC	mountain big sagebrush/western needlegrass	PCT	SS4915	Cool Dry US	Cold US
ARTRV-PUTR/FEID	mountain big sagebrush-bitterbrush/Idaho fescue	PCT	SD2916	Hot Moist US	Moist US
ARTRV-SYOR/BRCA	mountain big sagebrush-mountain snowberry/mountain brome	PCT	SD2917	Warm Moist US	Moist US
BEOC/MESIC FORB	water birch/mesic forb	PCT	SW3112	Warm Moderate SM RS	Moderate SM RS
BEOC/WET SEDGE	water birch/wet sedge	PCT	SW3113	Warm High SM RS	High SM RS
CAAM	bigleaved sedge	PA	MM2921	Warm High SM RH	High SM RH
CAAQ	aquatic sedge	PA	MM2914	Warm High SM RH	High SM RH
CACA	bluejoint reedgrass	PA	GM4111	Warm Moderate SM RH	Moderate SM RH
CACA4	silvery sedge	PCT	MS3113	Warm Moderate SM RH	Moderate SM RH
CACU (SEEP)	Cusick's camas (seep)	PCT	FW3911	Warm Very Moist UH	Moist UH
CACU2	Cusick's sedge	PA	MM2918	Warm High SM RH	High SM RH
CAGE (ALPINE)	elk sedge (alpine)	PCT	GS3911	Cold Dry UH	Cold UH
CAGE (UPLAND)	elk sedge (upland)	PCT	GS39	Cool Dry UH	Cold UH
CAHO	Hood's sedge	PCT	GS3912	Cool Moist UH	Cold UH
CALA	smoothstemmed sedge	PC	MW2913	Cold High SM RH	High SM RH
CALA3	woolly sedge	PA	MM2911	Warm Moderate SM RH	Moderate SM RH
CALA4	slender sedge	PC	MM2920	Warm High SM RH	High SM RH
CALEL2	densely tufted sedge	PA	MM2919	Warm Moderate SM RH	Moderate SM RH

PVT CODE	PVT COMMON NAME	STATUS	ECOCCLASS	PAG	PVG
CALU	woodrush sedge	PA	MM2916	Cold High SM RH	High SM RH
CAMU2	star sedge	PCT	MS3112	Warm Moderate SM RH	Moderate SM RH
CANE	Nebraska sedge	PCT	MM2912	Hot Moderate SM RH	Moderate SM RH
CANU4	torrent sedge	PCT	MM2922	Hot High SM RH	High SM RH
CAPR5	clustered field sedge	PCT	MW2912	Cold High SM RH	High SM RH
CASC5	Holm's sedge	PA	MS3111	Cold High SM RH	High SM RH
CASH	Sheldon's sedge	PCT	MM2932	Hot Moderate SM RH	Moderate SM RH
CASI2	shortbeaked sedge	PCT	MM2915	Warm High SM RH	High SM RH
CAST	sawbeak sedge	PCT	MW1926	Warm High SM RH	High SM RH
CAUT	bladder sedge	PA	MM2917	Warm High SM RH	High SM RH
CAVEV	inflated sedge	PA	MW1923	Warm High SM RH	High SM RH
CELE/CAGE	mountain mahogany/elk sedge	PCT	SD40	Hot Moist US	Moist US
CELE/FEID-AGSP	mountain mahogany/Idaho fescue-bluebunch wheatgrass	PA	SD4111	Hot Moist US	Moist US
CERE2/AGSP	netleaf hackberry/bluebunch wheatgrass	PA	SD5611	Hot Moist US	Moist US
CEVE	snowbrush ceanothus	PCT	SM33	Warm Moist US	Moist US
CILA2	drooping woodreed	PC	MW2927	Cold High SM RH	High SM RH
COST	redosier dogwood	PA	SW5112	Hot Moderate SM RS	Moderate SM RS
COST/SAAR4	redosier dogwood/brook saxifrage	PCT	SW5118	Warm High SM RS	High SM RS
CRDO	Douglas hawthorne	PCT	SW3111	Hot Low SM RS	Low SM RS
DECE	tufted hairgrass	PA	MM1912	Warm Moderate SM RH	Moderate SM RH
ELBE	delicate spikerush	PC	MS4111	Cold High SM RH	High SM RH
ELCI	basin wildrye	PA	GB7111	Hot Very Moist UH	Moist UH
ELPA	creeping spikerush	PA	MW4912	Hot High SM RH	High SM RH
ELPA2	fewflowered spikerush	PCT	MW4911	Cold High SM RH	High SM RH
EQAR	common horsetail	PA	FW4212	Warm Moderate SM RH	Moderate SM RH
ERDO-POSA3	Douglas buckwheat/Sandberg's bluegrass	PCT	FM9111	Hot Dry UH	Dry UH
ERIOG/PHOR	buckwheat/Oregon bladderpod	PA	SD9322	Hot Dry UH	Dry UH
ERST2-POSA3	strict buckwheat/Sandberg's bluegrass	PCT	FM9112	Hot Dry UH	Dry UH
ERUM (RIDGE)	sulphurflower (ridge)	PCT	FM9113	Hot Dry UH	Dry UH
FEID (ALPINE)	Idaho fescue (alpine)	PCT	GS12	Cold Moist UH	Cold UH
FEID-AGSP	Idaho fescue-bluebunch wheatgrass	PA	GB59	Warm Moist UH	Moist UH
FEID-AGSP (RIDGE)	Idaho fescue-bluebunch wheatgrass (ridge)	PCT	GB5915	Warm Moist UH	Moist UH
FEID-AGSP-BASA	Idaho fescue-bluebunch wheatgrass-balsamroot	PA	GB5917	Warm Moist UH	Moist UH
FEID-AGSP-LUSE	Idaho fescue-bluebunch wheatgrass-silky lupine	PA	GB5916	Warm Moist UH	Moist UH
FEID-AGSP-PHCO2	Idaho fescue-bluebunch wheatgrass-Snake River phlox	PA	GB5918	Warm Moist UH	Moist UH
FEID-CAGE	Idaho fescue-elk sedge	PCT	GB5922	Warm Moist UH	Moist UH
FEID-CAHO	Idaho fescue-Hood's sedge	PA	GB5921	Warm Moist UH	Moist UH
FEID-DAIN-CAREX	Idaho fescue-timber oatgrass-sedge	PA	GB5920	Warm Very Moist UH	Moist UH
FEID-KOCR (HIGH)	Idaho fescue-prairie junegrass (high)	PA	GB5913	Cool Moist UH	Cold UH
FEID-KOCR (LOW)	Idaho fescue-prairie junegrass (low)	PA	GB5914	Warm Moist UH	Moist UH

PVT CODE	PVT COMMON NAME	STATUS	ECOCCLASS	PAG	PVG
FEID-KOCR (MOUND)	Idaho fescue-prairie junegrass (mound)	PA	GB5912	Cool Moist UH	Cold UH
FEID-KOCR (RIDGE)	Idaho fescue-prairie junegrass (ridge)	PA	GB5911	Cool Moist UH	Cold UH
FEVI	green fescue	PCT	GS11	Cold Moist UH	Cold UH
FEVI-CAHO	green fescue-Hood's sedge	PCT	GS1111	Cold Moist UH	Cold UH
FEVI-LULA2	green fescue-spurred lupine	PA	GS1112	Cold Moist UH	Cold UH
GLEL	tall mannagrass	PA	MM2925	Warm High SM RH	High SM RH
GLNE/AGSP	spiny greenbush/bluebunch wheatgrass	PA	SD65	Hot Dry US	Dry US
JUBA	Baltic rush	PCT	MW3912	Hot Moderate SM RH	Moderate SM RH
JUOC/ARAR	western juniper/low sagebrush	PCT	CJS1	Hot Dry UW	Dry UW
JUOC/ARRI	western juniper/stiff sagebrush	PCT	CJS8	Hot Dry UW	Dry UW
JUOC/ARTRV	western juniper/mountain big sagebrush	PCT	CJS2	Hot Moist UW	Moist UW
JUOC/ARTRV/FEID-AGSP	western juniper/mountain big sagebrush/fescue-wheatgrass	PA	CJS211	Hot Moist UW	Moist UW
JUOC/CELE/CAGE	western juniper/mountain mahogany/elk sedge	PCT	CJS42	Hot Moist UW	Moist UW
JUOC/CELE/FEID-AGSP	western juniper/mountain mahogany/fescue-wheatgrass	PCT	CJS41	Hot Moist UW	Moist UW
JUOC/FEID-AGSP	western juniper/Idaho fescue-bluebunch wheatgrass	PA	CJG111	Hot Moist UW	Moist UW
JUOC/PUTR/FEID-AGSP	western juniper/bitterbrush/Idaho fescue-bluebunch wheatgrass	PA	CJS321	Hot Moist UW	Moist UW
LECOW	Wallowa Lewisia	PCT	FX4111	Hot Dry UH	Dry UH
METR	buckbean	PC	FW6111	Warm High SM RH	High SM RH
PERA3-SYOR	squaw apple-mountain snowberry	PCT	SD30	Hot Moist US	Moist US
PHLE2 (TALUS)	syringa bordered strips (talus)	PCT	NTS111	Hot Very Moist US	Moist US
PHMA-SYAL	ninebark-common snowberry	PA	SM1111	Warm Moist US	Moist US
PICO(ABGR)/ALSI	lodgepole pine(grand fir)/Sitka alder	PCT	CLS58	Cool Very Moist UF	Moist UF
PICO(ABGR)/ARNE	lodgepole pine(grand fir)/pinemat manzanita	PCT	CLS57	Cool Dry UF	Cold UF
PICO(ABGR)/CARU	lodgepole pine(grand fir)/pinegrass	PCT	CLG21	Cool Dry UF	Cold UF
PICO(ABGR)/LIBO2	lodgepole pine(grand fir)/twinflower	PCT	CLF211	Cool Moist UF	Moist UF
PICO(ABGR)/VAME	lodgepole pine(grand fir)/big huckleberry	PCT	CLS513	Cool Moist UF	Moist UF
PICO(ABGR)/VAME/CARU	lodgepole pine(grand fir)/big huckleberry/pinegrass	PCT	CLS512	Cool Moist UF	Moist UF
PICO(ABGR)/VAME/PTAQ	lodgepole pine(grand fir)/big huckleberry/bracken	PCT	CLS519	Cool Moist UF	Moist UF
PICO(ABGR)/VASC/CARU	lodgepole pine(grand fir)/grouse huckleberry/pinegrass	PCT	CLS417	Cold Dry UF	Cold UF
PICO(ABLA2)/CAGE	lodgepole pine(subalpine fir)/elk sedge	PCT	CLG322	Cold Dry UF	Cold UF
PICO(ABLA2)/STOC	lodgepole pine(subalpine fir)/western needlegrass	PCT	CLG11	Cold Dry UF	Cold UF
PICO(ABLA2)/VAME	lodgepole pine(subalpine fir)/big huckleberry	PCT	CLS514	Cool Moist UF	Moist UF
PICO(ABLA2)/VAME/CARU	lodgepole pine(subalpine fir)/big huckleberry/pinegrass	PCT	CLS516	Cool Moist UF	Moist UF
PICO(ABLA2)/VASC	lodgepole pine(subalpine fir)/grouse huckleberry	PCT	CLS418	Cold Dry UF	Cold UF
PICO(ABLA2)/VASC/POPU	lodgepole pine(subalpine fir)/grouse huckleberry/polemonium	PCT	CLS415	Cold Dry UF	Cold UF
PICO/ALIN/MESIC FORB	lodgepole pine/mountain alder/mesic forb	PC	CLM511	Cold Moderate SM RF	Moderate SM RF
PICO/CAAQ	lodgepole pine/aquatic sedge	PA	CLM114	Cold High SM RF	High SM RF
PICO/CACA	lodgepole pine/bluejoint reedgrass	PC	CLM117	Cold Moderate SM RF	Moderate SM RF
PICO/CALA3	lodgepole pine/woolly sedge	PC	CLM116	Cold Moderate SM RF	Moderate RF
PICO/CARU	lodgepole pine/pinegrass	PA	CLS416	Cool Dry UF	Cold UF

PVT CODE	PVT COMMON NAME	STATUS	ECOCCLASS	PAG	PVG
PICO/DECE	lodgepole pine/tufted hairgrass	PA	CLM115	Cold Moderate SM RF	Moderate SM RF
PICO/POPR	lodgepole pine/Kentucky bluegrass	PCT	CLM112	Cold Low SM RF	Low SM RF
PIEN/ATFI	Engelmann spruce/ladyfern	PCT	CEF334	Cold High SM RF	High SM RF
PIEN/BRVU	Engelmann spruce/Columbia brome	PCT	CEM125	Cold Low SM RF	Low SM RF
PIEN/CADI	Engelmann spruce/softleaved sedge	PA	CEM121	Cold High SM RF	High SM RF
PIEN/CILA2	Engelmann spruce/drooping woodreed	PC	CEM126	Cold Moderate SM RF	Moderate SM RF
PIEN/COST	Engelmann spruce/redosier dogwood	PA	CES511	Cold Moderate SM RF	Moderate SM RF
PIEN/EQAR	Engelmann spruce/common horsetail	PA	CEM211	Cold Moderate SM RF	Moderate SM RF
PIEN/SETR	Engelmann spruce/arrowleaf groundsel	PCT	CEF335	Cold High SM RF	High SM RF
PIMO/DECE	western white pine/tufted hairgrass	PCT	CQM111	Warm Moderate SM RF	Moderate SM RF
PIPO/AGSP	ponderosa pine/bluebunch wheatgrass	PA	CPG111	Hot Dry UF	Dry UF
PIPO/ARAR	ponderosa pine/low sagebrush	PCT	CPS61	Hot Moist UF	Dry UF
PIPO/ARTRV/CAGE	ponderosa pine/mountain big sagebrush/elk sedge	PCT	CPS132	Hot Dry UF	Dry UF
PIPO/ARTRV/FEID-AGSP	ponderosa pine/mountain big sagebrush/fescue-wheatgrass	PA	CPS131	Hot Dry UF	Dry UF
PIPO/CAGE	ponderosa pine/elk sedge	PA	CPG222	Warm Dry UF	Dry UF
PIPO/CARU	ponderosa pine/pinegrass	PA	CPG221	Warm Dry UF	Dry UF
PIPO/CELE/CAGE	ponderosa pine/mountain mahogany/elk sedge	PA	CPS232	Warm Dry UF	Dry UF
PIPO/CELE/FEID-AGSP	ponderosa pine/mountain mahogany/fescue-wheatgrass	PA	CPS234	Hot Dry UF	Dry UF
PIPO/CELE/PONE	ponderosa pine/mountain mahogany/Wheeler's bluegrass	PA	CPS233	Hot Dry UF	Dry UF
PIPO/ELGL	ponderosa pine/blue wildrye	PA	CPM111	Warm Dry UF	Dry UF
PIPO/FEID	ponderosa pine/Idaho fescue	PA	CPG112	Hot Dry UF	Dry UF
PIPO/PERA3	ponderosa pine/squaw apple	PCT	CPS8	Hot Dry UF	Dry UF
PIPO/POPR	ponderosa pine/Kentucky bluegrass	PCT	CPM112	Hot Low SM RF	Low SM RF
PIPO/PUTR/AGSP	ponderosa pine/bitterbrush/bluebunch wheatgrass	PCT	CPS231	Hot Dry UF	Dry UF
PIPO/PUTR/CAGE	ponderosa pine/bitterbrush/elk sedge	PA	CPS222	Warm Dry UF	Dry UF
PIPO/PUTR/CARO	ponderosa pine/bitterbrush/Ross sedge	PA	CPS221	Warm Dry UF	Dry UF
PIPO/PUTR/FEID-AGSP	ponderosa pine/bitterbrush/Idaho fescue-bluebunch wheatgrass	PA	CPS226	Hot Dry UF	Dry UF
PIPO/RHGL	ponderosa pine/sumac	PCT	CPS9	Hot Dry UF	Dry UF
PIPO/SPBE	ponderosa pine/birchleaf spiraea	PCT	CPS523	Warm Dry UF	Dry UF
PIPO/SYAL	ponderosa pine/common snowberry	PA	CPS522	Warm Dry UF	Dry UF
PIPO/SYAL (FLOODPLAIN)	ponderosa pine/common snowberry (floodplain)	PA	CPS511	Hot Low SM RF	Low SM RF
PIPO/SYOR	ponderosa pine/mountain snowberry	PA	CPS525	Warm Dry UF	Dry UF
POFR/DECE	shrubby cinquefoil/tufted hairgrass	PA	SW5113	Warm Moderate SM RS	Moderate SM RS
POFR/POPR	shrubby cinquefoil/Kentucky bluegrass	PCT	SW5114	Warm Low SM RS	Low SM RS
POPR (DEGEN BENCH)	Kentucky bluegrass (degenerated bench)	PCT	MD3112	Cool Moist UH	Cold UH
POPR (MEADOW)	Kentucky bluegrass (meadow)	PCT	MD3111	Warm Low SM RH	Low SM RH
POSA3-DAUN	Sandberg's bluegrass-onespike oatgrass	PA	GB9111	Hot Dry UH	Dry UH
POTR/ALIN-COST	quaking aspen/mountain alder-redosier dogwood	PCT	HQS222	Warm Moderate SM RF	Moderate SM RF
POTR/ALIN-SYAL	quaking aspen/mountain alder-common snowberry	PCT	HQS223	Warm Moderate SM RF	Moderate SM RF
POTR/CAAQ	quaking aspen/aquatic sedge	PCT	HQM212	Warm High SM RF	High SM RF

PVT CODE	PVT COMMON NAME	STATUS	ECOCCLASS	PAG	PVG
POTR/CACA	quaking aspen/bluejoint reedgrass	PCT	HQM123	Warm Moderate SM RF	Moderate SM RF
POTR/CALA3	quaking aspen/woolly sedge	PA	HQM211	Warm Moderate SM RF	Moderate SM RF
POTR/MESIC FORB	quaking aspen/mesic forb	PCT	HQM511	Warm Moderate SM RF	Moderate SM RF
POTR/POPR	quaking aspen/Kentucky bluegrass	PCT	HQM122	Hot Low SM RF	Low SM RF
POTR/SYAL	quaking aspen/common snowberry	PCT	HQS221	Hot Moderate SM RF	Moderate SM RF
POTR2/ACGL	black cottonwood/Rocky Mountain maple	PCT	HCS114	Warm Moderate SM RF	Moderate SM RF
POTR2/ALIN-COST	black cottonwood/mountain alder-redosier dogwood	PA	HCS113	Warm Moderate SM RF	Moderate SM RF
POTR2/SALA2	black cottonwood/Pacific willow	PA	HCS112	Hot Moderate SM RF	Moderate SM RF
POTR2/SYAL	black cottonwood/common snowberry	PCT	HCS311	Hot Moderate SM RF	Moderate SM RF
PSME/ACGL-PHMA	Douglas-fir/Rocky Mountain maple-mallow ninebark	PA	CDS722	Warm Moist UF	Moist UF
PSME/ACGL-PHMA (FLOODPLAIN)	Douglas-fir/Rocky Mountain maple-mallow ninebark (floodplain)	PA	CDS724	Warm Moderate SM RF	Moderate SM RF
PSME/CAGE	Douglas-fir/elk sedge	PA	CDG111	Warm Dry UF	Dry UF
PSME/CARU	Douglas-fir/pinegrass	PA	CDG121	Warm Dry UF	Dry UF
PSME/CELE/CAGE	Douglas-fir/mountain mahogany/elk sedge	PCT	CDS	Warm Dry UF	Dry UF
PSME/HODI	Douglas-fir/oceanspray	PA	CDS611	Warm Moist UF	Moist UF
PSME/PHMA	Douglas-fir/ninebark	PA	CDS711	Warm Dry UF	Dry UF
PSME/SPBE	Douglas-fir/birchleaf spiraea	PA	CDS634	Warm Dry UF	Dry UF
PSME/SYAL	Douglas-fir/common snowberry	PA	CDS622	Warm Dry UF	Dry UF
PSME/SYAL (FLOODPLAIN)	Douglas-fir/common snowberry (floodplain)	PA	CDS628	Warm Low SM RF	Low SM RF
PSME/SYOR	Douglas-fir/mountain snowberry	PA	CDS625	Warm Dry UF	Dry UF
PSME/TRCA3	Douglas-fir/false bugbane	PCT	CDF313	Warm Moderate SM RF	Moderate SM RF
PSME/VAME	Douglas-fir/big huckleberry	PA	CDS812	Warm Dry UF	Dry UF
PUPA	weak alkaligrass	PA	MM2926	Warm High SM RH	High SM RH
PUTR/AGSP	bitterbrush/bluebunch wheatgrass	PA	SD3112	Hot Moist US	Moist US
PUTR/FEID-AGSP	bitterbrush/Idaho fescue-bluebunch wheatgrass	PA	SD3111	Warm Moist US	Moist US
RHAL2/MESIC FORB	alderleaved buckthorn/mesic forb	PCT	SW5117	Warm Moderate SM RS	Moderate SM RS
RHGL/AGSP	smooth sumac/bluebunch wheatgrass	PA	SD6121	Hot Dry US	Dry US
RIBES/CILA2	currants/drooping woodreed	PCT	SW5111	Warm High SM RS	High SM RS
RIBES/GLEL	currants/tall mannagrass	PCT	SW5116	Warm High SM RS	High SM RS
RIBES/MESIC FORB	currants/mesic forb	PCT	SW5115	Warm Moderate SM RS	Moderate SM RS
SAAR4	brook saxifrage	PCT	FW6113	Warm High SM RH	High SM RH
SACO2/CAPR5	undergreen willow/clustered field sedge	PC	SW1128	Cold High SM RS	High SM RS
SACO2/CASC5	undergreen willow/Holm's sedge	PA	SW1121	Cold High SM RS	High SM RS
SACO2/CAUT	undergreen willow/bladder sedge	PCT	SW1127	Cold High SM RS	High SM RS
SAEA-SATW/CAAQ	Eastwood willow-Tweedy willow/aquatic sedge	PC	SW1129	Warm High SM RS	High SM RS
SAEX	coyote willow	PA	SW1117	Hot Moderate SM RS	Moderate SM RS
SALIX/CAAQ	willow/aquatic sedge	PA	SW1114	Warm High SM RS	High SM RS
SALIX/CACA	willow/bluejoint reedgrass	PC	SW1124	Warm Moderate SM RS	Moderate SM RS
SALIX/CALA3	willow/woolly sedge	PA	SW1112	Warm Moderate SM RS	Moderate SM RS
SALIX/CAUT	willow/bladder sedge	PA	SW1123	Warm High SM RS	High SM RS

PVT CODE	PVT COMMON NAME	STATUS	ECOCLASS	PAG	PVG
SALIX/MESIC FORB	willow/mesic forb	PCT	SW1125	Warm Moderate SM RS	Moderate SM RS
SALIX/POPR	willow/Kentucky bluegrass	PCT	SW1111	Warm Low SM RS	Low SM RS
SARI	rigid willow	PCT	SW1126	Hot Moderate SM RS	Moderate SM RS
SASC/ELGL	Scouler willow/blue wildrye	PC	SW1130	Cool Moist US	Cold US
SCMI	smallfruit bulrush	PA	MM2924	Warm High SM RH	High SM RH
SETR	arrowleaf groundsel	PA	FW4211	Warm High SM RH	High SM RH
SPCR (RIVER TERRACE)	sand dropseed (river terrace)	PA	GB1211	Hot Dry UH	Dry UH
STOC	western needlegrass	PCT	GS10	Cool Moist UH	Cold UH
SYAL/FEID-AGSP-LUSE	common snowberry/fescue-wheatgrass-silky lupine	PCT	GB5121	Warm Moist US	Moist US
SYAL/FEID-KOCR	common snowberry/Idaho fescue-prairie junegrass	PCT	GB5919	Warm Moist US	Moist US
SYAL-ROSA	common snowberry-rose	PCT	SM3111	Warm Moist US	Moist US
SYOR	mountain snowberry	PCT	SM32	Warm Moist US	Moist US
TSME/VAME	mountain hemlock/big huckleberry	PA	CMS231	Cold Dry UF	Cold UF
TSME/VASC	mountain hemlock/grouse huckleberry	PA	CMS131	Cold Dry UF	Cold UF
TYLA	common cattail	PCT	MT8121	Hot High SM RH	High SM RH
VEAM	American speedwell	PA	FW6112	Warm High SM RH	High SM RH
VERAT	false hellebore	PC	FW5121	Warm Moderate SM RH	Moderate SM RH

¹ This appendix is organized alphabetically by PVT code. Column descriptions are:

PVT CODE provides an alphanumeric code for each of 296 potential vegetation types described for Blue Mountains section.

PVT COMMON NAME provides a common name for each potential vegetation type.

STATUS provides classification status for each potential vegetation type: PA is Plant Association; PCT is Plant Community Type; PC is Plant Community.

ECOCLASS codes are used to record potential vegetation type determinations.

PAG (Plant Association Group) and PVG (Potential Vegetation Group) are two levels of a mid-scale potential vegetation hierarchy; PAG and PVG codes use the following abbreviations: SM is Soil Moisture, UF is Upland Forest physiognomic class, UW is Upland Woodland physiognomic class, US is Upland Shrubland physiognomic class, UH is Upland Herbland physiognomic class, RF is Riparian Forest physiognomic class, RS is Riparian Shrubland physiognomic class, and RH is Riparian Herbland physiognomic class.

APPENDIX 2: SILVICULTURE WHITE PAPERS

White papers are internal reports, and they are produced with a consistent formatting and numbering scheme – all papers dealing with Silviculture, for example, are placed in a silviculture series (Silv) and numbered sequentially. Generally, white papers receive only limited review and, in some instances pertaining to highly technical or narrowly focused topics, the papers may receive no technical peer review at all. For papers that receive no review, the viewpoints and perspectives expressed in the paper are those of the author only, and do not necessarily represent agency positions of the Umatilla National Forest or the USDA Forest Service.

Large or important papers, such as two papers discussing active management considerations for dry and moist forests (white papers Silv-4 and Silv-7, respectively), receive extensive review comparable to what would occur for a research station general technical report (but they don't receive blind peer review, a process often used for journal articles).

White papers are designed to address a variety of objectives:

- (1) They guide how a methodology, model, or procedure is used by practitioners on the Umatilla National Forest (to ensure consistency from one unit, or project, to another).
- (2) Papers are often prepared to address ongoing and recurring needs; some papers have existed for more than 20 years and still receive high use, indicating that the need (or issue) has long standing – an example is white paper #1 describing the Forest's big-tree program, which has operated continuously for 25 years.
- (3) Papers are sometimes prepared to address emerging or controversial issues, such as management of moist forests, elk thermal cover, or aspen forest in the Blue Mountains. These papers help establish a foundation of relevant literature, concepts, and principles that continuously evolve as an issue matures, and hence they may experience many iterations through time. [But also note that some papers have not changed since their initial development, in which case they reflect historical concepts or procedures.]
- (4) Papers synthesize science viewed as particularly relevant to geographical and management contexts for the Umatilla National Forest. This is considered to be the Forest's self-selected 'best available science' (BAS), realizing that non-agency commenters would generally have a different conception of what constitutes BAS – like beauty, BAS is in the eye of the beholder.
- (5) The objective of some papers is to locate and summarize the science germane to a particular topic or issue, including obscure sources such as master's theses or Ph.D. dissertations. In other instances, a paper may be designed to wade through an overwhelming amount of published science (dry-forest management), and then synthesize sources viewed as being most relevant to a local context.
- (6) White papers function as a citable literature source for methodologies, models, and procedures used during environmental analysis – by citing a white paper, specialist reports can include less verbiage describing analytical databases, techniques, and so forth, some of which change little (if at all) from one planning effort to another.
- (7) White papers are often used to describe how a map, database, or other product was developed. In this situation, the white paper functions as a 'user's guide' for the new product. Examples include papers dealing with historical products: (a) historical fire extents for the Tucannon watershed (WP Silv-21); (b) an 1880s map developed from General Land Office survey notes (WP Silv-41); and (c) a

description of historical mapping sources (24 separate items) available from the Forest's history website (WP Silv-23).

The following papers are available from the Forest's website: [Silviculture White Papers](#)

Paper #	Title
1	Big tree program
2	Description of composite vegetation database
3	Range of variation recommendations for dry, moist, and cold forests
4	Active management of Blue Mountains dry forests: Silvicultural considerations
5	Site productivity estimates for upland forest plant associations of Blue and Ochoco Mountains
6	Blue Mountains fire regimes
7	Active management of Blue Mountains moist forests: Silvicultural considerations
8	Keys for identifying forest series and plant associations of Blue and Ochoco Mountains
9	Is elk thermal cover ecologically sustainable?
10	A stage is a stage is a stage...or is it? Successional stages, structural stages, seral stages
11	Blue Mountains vegetation chronology
12	Calculated values of basal area and board-foot timber volume for existing (known) values of canopy cover
13	Created opening, minimum stocking, and reforestation standards from Umatilla National Forest Land and Resource Management Plan
14	Description of EVG-PI database
15	Determining green-tree replacements for snags: A process paper
16	Douglas-fir tussock moth: A briefing paper
17	Fact sheet: Forest Service trust funds
18	Fire regime condition class queries
19	Forest health notes for an Interior Columbia Basin Ecosystem Management Project field trip on July 30, 1998 (handout)
20	Height-diameter equations for tree species of Blue and Wallowa Mountains
21	Historical fires in headwaters portion of Tucannon River watershed
22	Range of variation recommendations for insect and disease susceptibility
23	Historical vegetation mapping
24	How to measure a big tree
25	Important Blue Mountains insects and diseases
26	Is this stand overstocked? An environmental education activity
27	Mechanized timber harvest: Some ecosystem management considerations
28	Common plants of south-central Blue Mountains (Malheur National Forest)
29	Potential natural vegetation of Umatilla National Forest
30	Potential vegetation mapping chronology
31	Probability of tree mortality as related to fire-caused crown scorch
32	Review of "Integrated scientific assessment for ecosystem management in the interior Columbia basin, and portions of the Klamath and Great basins" – Forest vegetation
33	Silviculture facts

Paper #	Title
34	Silvicultural activities: Description and terminology
35	Site potential tree height estimates for Pomeroy and Walla Walla Ranger Districts
36	Stand density protocol for mid-scale assessments
37	Stand density thresholds as related to crown-fire susceptibility
38	Umatilla National Forest Land and Resource Management Plan: Forestry direction
39	Updates of maximum stand density index and site index for Blue Mountains variant of Forest Vegetation Simulator
40	Competing vegetation analysis for southern portion of Tower Fire area
41	Using General Land Office survey notes to characterize historical vegetation conditions for Umatilla National Forest
42	Life history traits for common Blue Mountains conifer trees
43	Timber volume reductions associated with green-tree snag replacements
44	Density management field exercise
45	Climate change and carbon sequestration: Vegetation management considerations
46	Knutson-Vandenberg (K-V) program
47	Active management of quaking aspen plant communities in northern Blue Mountains: Regeneration ecology and silvicultural considerations
48	Tower Fire...then and now. Using camera points to monitor postfire recovery
49	How to prepare a silvicultural prescription for uneven-aged management
50	Stand density conditions for Umatilla National Forest: A range of variation analysis
51	Restoration opportunities for upland forest environments of Umatilla National Forest
52	New perspectives in riparian management: Why might we want to consider active management for certain portions of riparian habitat conservation areas?
53	Eastside Screens chronology
54	Using mathematics in forestry: An environmental education activity
55	Silviculture certification: Tips, tools, and trip-ups
56	Vegetation polygon mapping and classification standards: Malheur, Umatilla, and Wallowa-Whitman National Forests
57	State of vegetation databases for Malheur, Umatilla, and Wallowa-Whitman National Forests
58	Seral status for tree species of Blue and Ochoco Mountains

REVISION HISTORY

November 2006: First version of this report was prepared in November 2006 immediately after a large wildfire (Columbia Complex) was declared controlled. Initially, it was thought that a significant timber salvage project would be proposed for the wildfire area, and analyzed by using an Environmental Impact Statement.

This white paper was initially prepared to support a postfire salvage timber harvest proposal for Columbia Complex Fire. The scope of this analysis, however, includes the entire north end of Umatilla NF (Pomeroy and Walla Walla Ranger Districts), so results and recommendations from this white paper are potentially applicable to all north-end forest management proposals requiring compliance with PACFISH RHCA standards, not just for the Columbia Complex wildfire area.

February 2017: Minor formatting and editing changes were made during this revision, including adding a white-paper header and assigning a white-paper number. An appendix was added describing a silviculture white paper system, including a list of available white papers. A Contents section and site index curves figure (cover page) were also added.