WHITE PAPER

USDA Forest Service Pacific Northwest Region Umatilla National Forest

WHITE PAPER F14-SO-WP-SILV-13

Created Opening, Minimum Stocking, and Reforestation Standards from Umatilla National Forest Land and Resource Management Plan[1]

David C. Powell; Forest Silviculturist
Supervisor's Office; Pendleton, OR

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[1] White papers are internal reports; they receive only limited review. Viewpoints expressed in this paper are those of the author – they do not necessarily represent official positions of USDA Forest Service.

INTRODUCTION

Perhaps no silvicultural activity has more influence on future forest conditions than reforestation. Decisions made during this important phase of forest management are likely to affect stand development in the near-term, and could very well determine whether a forest is resilient to future disturbances, including climate change. Trees we plant next spring could still be alive a century or more from now – and still influencing whether a properly functioning forest is present.

Trees, and forests, provide valuable ecosystem benefits – tree seed for regeneration, visual and aesthetic diversity, snags and dead wood as wildlife habitat, clean drinking water, and a myriad of other services. One of the roles and responsibilities of the reforestation process is to help provide these ecosystem services by putting the right trees, in the right places, at the right times, and for the right reasons.

This white paper was initially prepared soon after the Umatilla National Forest's Land and Resource Management Plan (Forest Plan or FP) was adopted in 1990 (USDA Forest Service 1990b). Its original role was to provide context for FP standards relating to created openings; created-opening standards were developed for every national forest in the Pacific Northwest Region in response to a requirement from the National Forest Management Act of 1976.

Recent versions of this white paper were expanded to meet two other objectives: (1) summarize FP direction regarding reforestation practices, and (2) attempt to provide clarity about minimum stocking standards by proposing that the FP be amended to provide additional size-class detail for tree diameters beyond seedling and sapling classes. Proposed revisions to minimum stocking standards were never implemented by amending the FP, but they were included in several direction letters issued by Umatilla NF Forest Supervisor (such as Martin 2014).

CREATED OPENING CONSIDERATIONS

Forest-wide standards and guidelines from Umatilla National Forest's Land and Resource Management Plan (FP), in conjunction with information from Pacific Northwest Region's Regional Guide, provide the following direction regarding created openings:

1. Item 3, Horizontal Diversity section, page 4-73 in Umatilla NF FP: "The Forest will conform to the Regional guidelines on created forest openings. Forest openings created by even-aged silviculture should not exceed 40 acres. Exceptions are permitted in the following cases:
   a. When natural catastrophic situations such as fires, windstorms, or insect or disease attacks occur;
   b. On an individual case by case basis after a 60-day public notice and review by the Regional Forester;
   c. When any one of the criteria in the Regional Plan is met but not exceeded by more than 50 percent without review by the Regional Forester or 60-day public notice."
2. Description of alternative 3, Regional Guide/FEIS, page 2-9: "Forest openings created by the application of even-aged harvest cutting methods shall be limited to a maximum size of 60 acres in the Douglas-fir type of the coastal Douglas-fir zone and to a maximum size of 40 acres for all other forest types in the Pacific Northwest Region. Exceptions are permitted for

natural catastrophic events (such as fires, windstorms, or insect and disease attacks) or on an individual basis after a 60-day public notice period and review by the Regional Forester. In addition, the limits may be exceeded by as much as 50 percent without necessitating review by the Regional Forester, or 60 days public notice, when exceeding the limit will produce a more desirable combination of net public benefits and when any one of the following criteria is met.

a. When a larger created opening will enable the use of an economically feasible logging system that will lessen the disturbance to soil, water, fish, riparian resources, or residual vegetation. Such lessening is to be achieved by reducing landing or road construction, by enabling such construction away from unstable soil, or by reducing soil and vegetation disturbance caused by dragging logs.
b. When created openings cannot be centered around groups of trees infected with dwarf mistletoe or root rot and therefore need to be expanded to include these trees in order to avoid infection of susceptible adjacent conifers.
c. When visual quality objectives require openings to be shaped and blended to fit the landform.
d. When larger openings are needed to achieve regeneration objectives in harvest areas being cut by the shelterwood method and when destruction of the newly created stand would occur as a result of delayed removal of shelter trees. This exception applies only to existing shelterwood units and to shelterwood units under contract prior to approval of the Forest Plan."

3. Item 4, Horizontal Diversity section, page 4-73 in Umatilla NF FP: "A *harvested area* will no longer be considered a created opening for timber management when the prescribed crop tree stocking is above minimum acceptable levels and trees are at or above 4½ feet in height and free to grow (MR). Where other resource management considerations are limiting, such as wildlife habitat and visual requirements, a created opening will no longer be considered an opening when the vegetation in it meets the management objective."

MINIMUM STOCKING CONSIDERATIONS

A phrase "above minimum acceptable levels" mentioned in item 3 above, Created Opening Considerations section, is assumed to refer to minimum stocking standards provided in a reforestation section of the FP's forest-wide standards and guidelines (item 3, page 4-70), as follows:

Working Group	Minimum Stocking: Live Trees Per Acre
Ponderosa Pine	100
North Associated	200
South Associated	150
Lodgepole Pine	100

In my judgment, the minimum stocking standards shown above were developed by using these assumptions:

- A primary concern was to address openings created by timber management, specifically even-aged, regeneration-cutting practices (particularly clearcutting) in green (live) tree

stands. This concern relates to successful regeneration of harvested areas within 5 years of final harvest, and related requirements, from National Forest Management Act (NFMA; Public Law 94-588, 1976).

- Stocking standards pertain to young stands of seedling- and sapling-sized trees, such as a plantation at time of certification (typically the third year after planting).
- Because large trees require more space for growth and development than small trees, stocking standards from page 4-70 in the FP are inappropriate (much too high) for stands with a predominance of trees that are pole-sized and larger.
- Harvest-unit size standards were not intended to apply in situations when timber harvest follows disturbance events such as wildfire or an insect outbreak. This relates to NFMA, which stated: "That such limits shall not apply to the size of areas harvested as a result of natural catastrophic conditions such as fire, insect and disease attack, or windstorm" (Sec. 6(g)(3) (F)(iv)). Since NFMA stated that timber harvest size limits do not apply for catastrophic conditions, it is often assumed that other NFMA requirements (minimum stocking levels, etc.) may also be inapplicable for catastrophic conditions (but I am not aware of an official or legal interpretation on this point).

REFORESTATION CONTEXT

This white paper will not repeat reforestation standards and guidelines from the FP. Most of the Plan's reforestation and created openings direction is Forest-wide, especially for 'suitable' management areas (MAs) such as C4 and E2. Some of the visual MAs (A3, A4, A5, and A7), however, provide reforestation standards and guidelines related specifically to those areas. MA-specific standards are provided in management-area sections of the FP (instead of the Forest-wide direction section).

As is the case for other management direction, I suggest that specialists always check individual management-area descriptions, for every MA occurring within your planning area, rather than assume that Forest-wide direction provides the only planning context relating to reforestation and created openings.

A section following this one provides my recommendations for how Forest-wide reforestation direction could be revised to incorporate more appropriate standards for minimum stocking. But first, I would like to provide some historical context describing how, and why, the revisions were prepared.

The Blue Mountains experienced a very intense and persistent outbreak of western spruce budworm between 1980 and 1992. After the outbreak collapsed in 1992, Heppner and North Fork John Day Ranger Districts proposed numerous salvage sales to remove some dead and dying trees resulting from long-term budworm defoliation (note that much more budworm damage occurred on south half of the Umatilla NF than on its north half).

As proposed budworm salvage sales moved through environmental analysis processes, Umatilla NF personnel realized that many FP standards and guidelines were not equipped to address highly disturbed conditions, primarily because they reflect a prevalent assumption that high levels of active management (as envisioned by the 1990 Forest Plan) would result in little or no future disturbance from agents like western spruce budworm and broad-scale wildfire.

A fundamental paradigm of the 1990 FP was:

1. An actively managed forest would experience little or no damage when wildfire, insects, or disease occur because management would successfully create conditions that were either resistant, or resilient, to disturbance-induced change.
2. Employees should expect low levels of wildfire, insects, and disease for actively managed forests because treatments would intentionally modify species composition, structure, and density to render them less susceptible to natural disturbance processes.

After recognizing that western spruce budworm caused more damage than anticipated by the FP, Umatilla NF assembled an interdisciplinary team (IDT) and asked them to prepare proposed revisions to FP standards and guidelines (Michael Hampton was IDT leader). Revisions would acknowledge that natural disturbance processes are normal and expected for most ecosystems, and they will occasionally occur at relatively impactful levels.

Proposed revisions to minimum acceptable stocking levels described in the next section, by FP working group, were developed as a proposed revision to the 1990 FP. They were prepared in consultation with Don Wood, Forest Silviculturist for Ochoco National Forest. This collaboration was done because the budworm outbreak was far-reaching, affecting all four national forests collectively referred to as Blue Mountains national forests (e.g., Malheur, Ochoco, Umatilla, and Wallowa-Whitman), and the Ochoco NF was also considering FP revisions to better account for disturbance impacts related to budworm activity.

Although minimum stocking levels were never used to officially amend the FP, they were included in a Umatilla NF salvage program letter signed by Forest Supervisor Jeff Blackwood on August 18, 1992 (Blackwood 1992). Jeff's letter required that expanded minimum stocking levels (as presented in this white paper) be used when determining if salvage units removing budworm-killed trees (units in Coal, Main, and other sales at Heppner RD, and Thistle, Mullein, Tarweed, and other sales at North Fork John Day RD) would qualify as created openings after harvest. Minimum stocking levels presented below were included in a recent "Minimum Tree Stocking Standards" letter by Forest Supervisor Kevin Martin (Martin 2014).

Although an interdisciplinary team worked for several years on proposed FP amendments, they were unfortunately never adopted due to a rapidly changing 'political' landscape – this was an era when Eastside Screens were issued, an 'Everett Report' was released, and Interior Columbia Basin Ecosystem Management Project was initiated. [Note that white paper F14-SO-WP-Silv-11, Blue Mountains Vegetation Chronology, describes this era in much more detail.]

Hindsight always occurs with 20/20 clarity, but I believe it is unfortunate that proposed FP revisions were never adopted because large wildfires began affecting Umatilla NF in mid- to late-1990s (1996 saw almost 100,000 acres burn in Bull, Summit, Tower, and Wheeler Point wildfires). Many of the same issues that arose when attempting to respond to budworm-killed stands also occurred when responding to fire-killed forests.

REFORESTATION RECOMMENDATIONS

Material in this Reforestation Recommendations section provides my proposed revision to existing reforestation direction (as contained in 1990 FP) to modify minimum stocking standards, along with certain other aspects of Forest-wide reforestation direction.

Reforestation; item 3, page 4-70.

In forest ecosystems where timber harvest follows a high-severity disturbance event, including, but not limited to, fire, insect and disease attack, or windstorm, an area will not be classed as a created opening when live-tree density, after salvage timber harvest, meets or exceeds the following minimum acceptable stocking standards specified by FP working group.

'Salvage timber harvest' refers to removal of trees that are already dead, plus any trees in imminent danger of being killed by insects or other injurious agents. 'Imminent danger' refers to trees exhibiting symptoms such that they would reasonably be expected to die within 5 years of the disturbance event.

3. Minimum acceptable stocking standards for South Associated working group:

Average Stand Diameter (DBH, Inches BH)	Minimum Acceptable Stocking
< 1	150 live trees per acre
1-6	125 live trees per acre
6-24	35 sq. ft. of live-tree basal area per acre
> 24	12 live trees per acre

The following table displays south associated working group standards as live trees per acre, and by diameter class.*

Average Stand Diameter (Inches BH)	Minimum Acceptable Stocking: Live Trees Per Acre	Health/Vigor Stocking: Live Trees Per Acre
< 1	150	300
1-6	125	240
8	100	240
10	64	220
12	45	195
14	33	170
16	25	135
18	20	110
20	16	90
22	13	75
24+	12	65

4. Minimum acceptable stocking standards for North Associated working group:

Average Stand Diameter (DBH, Inches BH)	Minimum Acceptable Stocking
< 1	200 live trees per acre
1-6	150 live trees per acre
6-24	35 sq. ft. of live-tree basal area per acre
> 24	12 live trees per acre

The following table displays north associated working group standards as live trees per acre, and by diameter class.*

Average Stand Diameter (Inches BH)	Minimum Acceptable Stocking: Live Trees Per Acre	Health/Vigor Stocking: Live Trees Per Acre
< 1	200	360
1-6	150	300
8	100	240
10	64	225
12	45	205
14	33	185
16	25	160
18	20	130
20	16	110
22	13	90
24+	12	75

5. Minimum acceptable stocking standards for the Ponderosa Pine working group:

Average Stand Diameter (DBH, Inches BH)	Minimum Acceptable Stocking
< 1	100 live trees per acre
1-6	100 live trees per acre
6-24	25 sq. ft. of live-tree basal area per acre
> 24	10 live trees per acre

The following table displays ponderosa pine working group standards as live trees per acre, and by diameter class.*

Average Stand Diameter (Inches BH)	Minimum Acceptable Stocking: Live Trees Per Acre	Health/Vigor Stocking: Live Trees Per Acre
< 1	100	150
1-6	100	150
8	72	130
10	46	125
12	32	115
14	23	105
16	18	90
18	14	75
20	11	65
22	10	55
24+	10	40

6. Minimum acceptable stocking standards for Lodgepole Pine working group:

Average Stand Diameter (DBH, Inches BH)	Minimum Acceptable Stocking
< 1	100 live trees per acre
1-6	100 live trees per acre
6-24	25 sq. ft. of live-tree basal area per acre
> 24	10 live trees per acre

The following table displays lodgepole pine working group standards as live trees per acre, and by diameter class.*

Average Stand Diameter (Inches BH)	Minimum Acceptable Stocking: Live Trees Per Acre	Health/Vigor Stocking: Live Trees Per Acre
< 1	100	200
1-6	100	200
8	72	200
10	46	175
12	32	150
14	23	125
16	18	100
18	14	80
20	11	70
22	10	55
24+	10	40

*** How To Use Diameter Class Tables (4 tables, above – 1 each by working group)**

1. *Average stand diameter* (column 1) refers to a quadratic mean diameter (QMD) for an entire stand; do not assume that any individual stand would contain all the diameter classes shown in a table.
2. *Minimum acceptable stocking* (column 2) provides a minimum number of live trees, per acre, that must be present in a stand of a given QMD for it to not be considered a created opening.
   An *acceptable* tree is one with capability to meet land management objectives of an area, including a vigor level, and lack of insect or disease activity, suggesting it could survive for at least 10 more years.
3. *Health/vigor stocking* (column 3) is a tree density associated with a FP timber yield table considered most conducive to stocking levels associated with high tree vigor and improved insect and disease resistance.

These tables providing minimum acceptable stocking by 2-inch diameter classes are designed to provide a reference framework only. It is neither intended, nor desired, that all live trees remaining after a salvage harvest have the same diameter. In fact, it is preferable that a minimum amount of 25 or 35 square feet of basal area per acre be provided as a range of tree

sizes, distributed throughout a treatment area as individual trees, or be present in small clumps or concentrated 'islands or enclaves' that might experience little or no salvage harvest.

Salvage timber harvest areas that are two acres or larger, and do not meet the minimum stocking standards, should be identified as a created opening (nonstocked area). All salvage areas that do not meet minimum acceptable stocking standards should be reported as a regeneration harvest (clearcut, seed-tree, shelterwood) in a Forest Service record-keeping and annual reporting system (such as FACTS), and promptly programed for regeneration treatments.

Reforestation prescriptions for disturbed areas that experienced uncharacteristic tree mortality should promote diverse, mixed-species stands.

On sites with high susceptibility to future damage from western spruce budworm, Douglas-fir tussock moth, and other defoliating insects, ponderosa pine, western white pine, lodgepole pine, western larch, broadleaved trees, and other non-host species should be established at ecologically appropriate levels (considering seral status) when developing reforestation prescriptions.

For situations where minimizing future susceptibility to defoliating insects is a management objective, at least two-thirds of tree species composition should consist of non-host species, in accordance with spruce budworm management research (Carlson and Wulf 1989).

FOREST PLAN WORKING GROUPS

Stocking standards presented in this section are categorized by working group. The FP characterized potential vegetation by using four working groups – ponderosa pine, north associated, south associated, and lodgepole pine. During preparation of 1990 Forest Plan, each plant community type (a potential vegetation unit described in Hall 1973) was assigned to a working group.

A total of 17 forested plant community types (Hall 1973) occur on Umatilla National Forest: 4 were assigned to a ponderosa pine working group, 10 were assigned to north and south associated working groups (north includes Pomeroy and Walla Walla Ranger Districts; south includes Heppner and North Fork John Day Ranger Districts), and 3 were assigned to a lodgepole pine working group (see FP FEIS appendix, page K-5, in USDA Forest Service 1990a). [Working group assignments were exclusionary – each plant community type could be assigned to one, and only one, working group.]

Since the early 1970s plant community type classification is no longer used by Blue Mountains national forests, table 1 shows how contemporary plant associations (as described for upland forest sites in Johnson and Clausnitzer 1992) can be assigned to FP working groups.

Table 1. Cross-walk table relating plant associations to FP working groups.

Plant Association Common Name	Ecoclass Code	Potential Vegetation Group	Working Group
Douglas-fir/big huckleberry	CDS821	Dry Upland Forest	North/South Associated
Douglas-fir/birchleaf spiraea	CDS634	Dry Upland Forest	North/South Associated
Douglas-fir/common snowberry	CDS624	Dry Upland Forest	North/South Associated
Douglas-fir/elk sedge	CDG111	Dry Upland Forest	North/South Associated
Douglas-fir/mallow ninebark	CDS711	Dry Upland Forest	North/South Associated
Douglas-fir/mountain snowberry	CDS625	Dry Upland Forest	North/South Associated
Douglas-fir/oceanspray	CDS611	Moist Upland Forest	North/South Associated
Douglas-fir/pinegrass	CDG112	Dry Upland Forest	North/South Associated
Douglas-fir/Rocky Mountain maple-mallow ninebark	CDS722	Moist Upland Forest	North/South Associated
Grand fir/big huckleberry	CWS212	Moist Upland Forest	North/South Associated
Grand fir/birchleaf spiraea	CWS322	Dry Upland Forest	North/South Associated
Grand fir/Columbia brome	CWG211	Moist Upland Forest	North/South Associated
Grand fir/elk sedge	CWG111	Dry Upland Forest	North/South Associated
Grand fir/false bugbane	CWF512	Moist Upland Forest	North/South Associated
Grand fir/grouse huckleberry	CWS811	Cold Upland Forest	North/South Associated
Grand fir/grouse huckleberry-twinflower	CWS812	Moist Upland Forest	North/South Associated
Grand fir/oakfern	CWF611	Moist Upland Forest	North/South Associated
Grand fir/Pacific yew/queencup beadlily	CWC811	Moist Upland Forest	North/South Associated
Grand fir/Pacific yew/twinflower	CWC812	Moist Upland Forest	North/South Associated
Grand fir/pinegrass	CWG113	Dry Upland Forest	North/South Associated
Grand fir/queencup beadlily	CWF421	Moist Upland Forest	North/South Associated
Grand fir/Rocky Mountain maple	CWS541	Moist Upland Forest	North/South Associated
Grand fir/swordfern-ginger	CWF612	Moist Upland Forest	North/South Associated
Grand fir/twinflower	CWF312	Moist Upland Forest	North/South Associated
Lodgepole pine/pinegrass	CLS416	Cold Upland Forest	Lodgepole Pine[1]
Ponderosa pine/bitterbrush/elk sedge	CPS222	Dry Upland Forest	Ponderosa Pine
Ponderosa pine/bitterbrush/Idaho fescue-blue-bunch wheatgrass	CPS226	Dry Upland Forest	Ponderosa Pine
Ponderosa pine/bitterbrush/Ross' sedge	CPS221	Dry Upland Forest	Ponderosa Pine
Ponderosa pine/bluebunch wheatgrass	CPG111	Dry Upland Forest	Ponderosa Pine
Ponderosa pine/common snowberry	CPS524	Dry Upland Forest	Ponderosa Pine
Ponderosa pine/elk sedge	CPG222	Dry Upland Forest	Ponderosa Pine
Ponderosa pine/Idaho fescue	CPG112	Dry Upland Forest	Ponderosa Pine
Ponderosa pine/mountain big sagebrush/Idaho fescue-bluebunch wheatgrass	CPS131	Dry Upland Forest	Ponderosa Pine
Ponderosa pine/mountain mahogany/elk sedge	CPS232	Dry Upland Forest	Ponderosa Pine
Ponderosa pine/mountain mahogany/Idaho fescue-bluebunch wheatgrass	CPS234	Dry Upland Forest	Ponderosa Pine
Ponderosa pine/mountain mahogany/Wheeler's bluegrass	CPS233	Dry Upland Forest	Ponderosa Pine

Plant Association Common Name	Ecoclass Code	Potential Vegetation Group	Working Group
Ponderosa pine/mountain snowberry	CPS525	Dry Upland Forest	Ponderosa Pine
Ponderosa pine/pinegrass	CPG221	Dry Upland Forest	Ponderosa Pine
Subalpine fir/big huckleberry	CES311	Moist Upland Forest	North/South Associated
Subalpine fir/elk sedge	CAG111	Cold Upland Forest	North/South Associated
Subalpine fir/false bugbane	CEF331	Moist Upland Forest	North/South Associated
Subalpine fir/grouse huckleberry	CES411	Cold Upland Forest	North/South Associated
Subalpine fir/grouse huckleberry/Jacob's ladder	CES415	Cold Upland Forest	North/South Associated
Subalpine fir/queencup beadlily	CES314	Moist Upland Forest	North/South Associated
Subalpine fir/rusty menziesia	CES221	Cold Upland Forest	North/South Associated
Subalpine fir/twinflower	CES414	Moist Upland Forest	North/South Associated

Sources/Notes: Plant associations are shown and organized by using their common names; codes and scientific names for the associations are provided in Powell et al. (2007). Only plant associations included in Johnson and Clausnitzer (1992) are included in this table. Ecoclass codes are used to record plant association determinations on field forms and in computer databases; ecoclass codes are described and listed in Hall (1998). Potential vegetation group (PVG) is a mid-scale hierarchical unit of potential vegetation; assignments of plant associations to PVGs is shown in Powell et al. (2007). Working groups are a mid-scale unit of potential vegetation established by the 1990 FP (USDA Forest Service 1990b); assignment of plant community types (a precursor of contemporary plant associations) described by Hall (1973) for the Blue Mountains to working groups is described in appendix K of the Final Environmental Impact Statement for the 1990 FP (see page K-5 specifically).

[1] Any of the lodgepole pine plant community types from Johnson and Clausnitzer (1992) should also be assigned to the lodgepole pine working group.

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APPENDIX: 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

May 2008: The first version of this white paper (7 p.) was prepared in February 1992 to help support implementation of a new Forest Plan for the Umatilla NF (plan was approved in June 1990). It was revised several times after that, primarily to elaborate on Forest Plan terminology, or to help 'cross-walk' Forest Plan classification systems (e.g., working groups) to contemporary classifications.

December 2016: This update reformatted the original white paper into a contemporary style by adding the first page 'white paper' header, assigning a white paper number, and adding an appendix describing the silviculture white paper system. A new table was added to 'cross-walk' contemporary plant associations (e.g., ecoclasses) to their corresponding Forest Plan working groups.