WHITE PAPER

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Description of EVG-PI Database[1]

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INTRODUCTION

On November 10, 1999, a work group met for a third time to continue discussions about managing vegetation data for Umatilla National Forest. Four decisions were made at this meeting – perhaps the most important one was to remove stand exam updates from an existing vegetation (EVG) database so it would only contain information derived from photo interpretation (PI) surveys.[2]

Stand exam data is now managed by using FSVeg, a national database system developed as part of an Natural Resource Information System (NRIS). My expectation is that stand exam and PI data will coexist in the same database again, but probably not before Polyveg (another NRIS application) is finally implemented in fiscal year 2004 or 2005.

Immediately following its conclusion, efforts got underway to implement decisions from the November 10th meeting. At this point, the following tasks have been completed: over 10,000 stand exams were

[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.
[2] "EVG Meeting Summary" (appendix 1) summarizes decisions made at a November 10, 1999 meeting.

loaded into FSVeg, all historical stand exam updates were removed from EVG, contracted PI updates for Heppner and North Fork John Day Ranger Districts were loaded into EVG, and separate PI and stand exam GIS coverages were developed.

EVG was recently used for several purposes including analysis of Douglas-fir tussock moth susceptibility, determination of lynx habitat, and characterization of vegetation conditions for watershed analyses. As a result of these projects, it became clear that the database contained errors and a comprehensive review and update effort was warranted. I recently completed such a review and numerous updates were made to correct errors or to address inconsistencies.

To facilitate review and revision of an EVG database, a 'flat-file' format was developed to portray a polygon's data in a single record. This differs from a normalized database structure where a separate record exists for each vegetation layer in a polygon. For example, a three-layer stand would have three records under a normalized approach. Although a normalized structure has some advantages, experience has repeatedly shown that a flat-file format is simpler and more intuitive for many users.

An objective of this document is to serve as a 'data dictionary' for a flat-file version of an EVG database. Here is the current status of EVG by Ranger District:

- Heppner Ranger District PI data reflects contracted updates based on 1997 aerial photography. Wheeler Point fire area was updated, although nonforest polygons (shrub, grass) generally were not.
- North Fork John Day Ranger District PI data reflects contracted updates based on 1995 natural color, and 1996 color infrared, aerial photography. The entire District was updated, including 1996 wildfire areas.
- Walla Walla Ranger District PI data was obtained from a 1990 contract based on 1987/1988 aerial photography. At this point, it is unknown if change detection updates completed in 1997 (based on 1993 photography) are included in the database.
- Pomeroy Ranger District PI data was derived from a 1990 contract and includes any District updates completed since then, including field surveys of Asotin and Tucannon watersheds completed between 1993 and 1995. Due to the watershed surveys, many Pomeroy polygons have detailed ecoclass codes (those with 4 or 6 digits). At this point, no PI updates based on the District's 1997 aerial photography have been made.

<u>Note</u>: All comments in this introductory section relate to database and Ranger District status when this white paper was initially prepared (January 2001). Current database conditions may differ from what is described here.

The remainder of this document describes each database field and its corresponding codes.

Standtag (**Standtag** is the database field name): Standtags establish a tie between GIS polygons and their associated database information. Some polygons are numbered using the new, 7-digit identifier (1-digit District code, 2-digit year of survey, consecutive 4-digit poly number), whereas others still use the historical, 10-digit number (1-digit District code, 2-digit quadrangle number, 1-digit north or south quad-half designator, PI for type of survey, 4-digit poly number).

Data Source (Source): This field provides the data source for each record.

Code	**Description**
PI	Photo interpretation exam
WT	Walk through field exam (currently, only used for Pomeroy's watershed survey updates)

Potential Vegetation Type (Ecoclass): A potential vegetation type (plant association, plant community type, plant community, or lifeform) was recorded for each polygon. With the exception of Pomeroy District, most of the EVG polygons contain a 2-digit lifeform code in this field (e.g., CX, CD, FM, etc.). Pomeroy's coding was changed, when necessary, to agree with a recently approved list of Blue Mountains ecoclass codes; appendix 2 provides a list of approved codes for the Umatilla National Forest. This list describes 2-digit lifeform codes in EVG:

Code	**Description**
AB	Administrative site
AR	Recreation site
AX	Administrative site
CA	Subalpine fir forest series
CB	Whitebark pine forest series
CD	Douglas-fir forest series
CE	Engelmann spruce forest series
CJ	Western juniper forest series
CL	Lodgepole pine forest series
CP	Ponderosa pine forest series
CT	Western larch forest series
CW	Grand fir forest series
CX	Conifer predominance (no series specified)
FM	Moist forblands
FS	Subalpine forb fields
FX	Other forblands
GA	Annual grasslands
GB	Bunchgrass grasslands
GM	Moist grasslands
GS	Subalpine grasslands
GX	Other grasslands
HC	Black cottonwood forest series
MD	Dry meadows
MM	Moist meadows
MS	Subalpine meadows
MT	Tule meadows
NF	Nonvegetated flood plains
NR	Nonvegetated rocklands
NT	Nonvegetated talus
SC	Chaparral shrublands
SD	Dry shrublands
SL	Low shrublands
SM	Moist shrublands
SS	Subalpine shrublands
ST	Tall shrublands
SW	Wet shrublands
SX	Other shrublands
WL	Water – lakes
WR	Water – rivers

Potential Vegetation Group (PVG): A derived field based on data in the ecoclass field, but only for polygons with a 4- or 6-digit ecoclass code. Refer to appendix 2 for a table showing how ecoclass codes were assigned to PVGs. *For forested polygons with a 2-digit ecoclass code, the Forest's potential vegetation map was used to assign a PVG*. Nonforest and nonvegetated polygons were assigned a PVG code based on their 2-digit ecoclass code.

Code	**Description**
Admin	Administrative sites (AB, AR, AX)
Cold UF	Cold Upland Forest PVG
Cold UG	Cold Upland Grassland PVG
Cold US	Cold Upland Shrubland PVG
Dry UF	Dry Upland Forest PVG
Dry UG	Dry Upland Grassland PVG
Dry US	Dry Upland Shrubland PVG
High SM RH	High Soil Moisture Riparian Herbland PVG
Low SM RH	Low Soil Moisture Riparian Herbland PVG
Mod SM RH	Moderate Soil Moisture Riparian Herbland PVG
Moist UF	Moist Upland Forest PVG
Moist UG	Moist Upland Grassland PVG
Moist US	Moist Upland Shrubland PVG
Moist UW	Moist Upland Woodland PVG
Nonveg	Nonvegetated sites (NF, NR, NT)
Water	Water sites (WL, WR)
Wet RF	Wet Riparian Forest PVG
Wet RS	Wet Riparian Shrubland PVG

Structural Class (Struc): A derived field that characterizes vertical structure for upland forest and woodland polygons. Structural classes were calculated using database queries. The queries used combinations of overstory cover *(CovA)*, overstory size *(SizA)*, understory cover *(UnCov)*, and understory size *(SizB)*. Queries differed slightly by PVG. Appendix 3 describes the structural class queries. See O'Hara and others (1996) and Powell (2000) for additional information about structural classes.

Code	**Description**
NF	Non-Forest and nonvegetated polygons
OFMS	Old Forest Multi Strata structural class
OFSS	Old Forest Single Stratum structural class
SECC	Stem Exclusion Closed Canopy structural class
SEOC	Stem Exclusion Open Canopy structural class
SI	Stand Initiation structural class
UR	Understory Reinitiation structural class
YFMS	Young Forest Multi Strata structural class
WOMS	Woodland Old Multi Strata structural class
WOSS	Woodland Old Single Stratum structural class
WSE	Woodland Stem Exclusion structural class
WSI	Woodland Stand Initiation structural class
WUR	Woodland Understory Reinitiation structural class

Cover Type (CovTyp): A derived field that describes the existing vegetation composition for each polygon. Polygons were considered nonforest when the total canopy cover of trees was less than 10 percent. Forest cover types where one species comprises more than half of the stocking are named for the majority species; types where no single species comprises more than half of the stocking are named for the plurality species along with a prefix ('mix') to denote the lack of a majority species (Eyre 1980). Cover type codes are described below.

Code	**Description**
ABGR	Grand fir is the majority species
ABLA2	Subalpine fir is the majority species
Admin	Administrative sites
Forb	Forbland sites (FM, FS, FX)
Grass	Grassland sites (GA, GB, GM, etc.)
JUOC	Western juniper is the majority species
LAOC	Western larch is the majority species
Meadow	Meadow sites (MD, MM, etc.)
mix-ABGR	Mixed forest; grand fir is the plurality species
mix-ABLA2	Mixed forest; subalpine fir is plurality species
mix-JUOC	Mixed forest; western juniper is plurality species
mix-LAOC	Mixed forest; western larch is plurality species
mix-PIAL	Mixed forest; whitebark pine is plurality species
mix-PICO	Mixed forest; lodgepole pine is plurality species
mix-PIEN	Mixed forest; Engelmann spruce is plurality species
mix-PIPO	Mixed forest; ponderosa pine is plurality species
mix-PSME	Mixed forest; Douglas-fir is plurality species
Nonveg	Nonvegetated sites (NF, NR, NT)
PIAL	Whitebark pine is the majority species
PICO	Lodgepole pine is the majority species
PIEN	Engelmann spruce is the majority species
PIPO	Ponderosa pine is the majority species
POTR	Quaking aspen is the majority species
POTR2	Black cottonwood is the majority species
PSME	Douglas-fir is the majority species
Shrub	Shrubland sites (SC, SD, etc.)
Water	Water sites (WL, WR)

Total Canopy Cover (TotCov): Total canopy cover was recorded for all polygons with a vegetation component (it was not coded for administrative sites, water or rock polygons, etc.). Total cover refers to the percentage of the ground surface obscured by plant foliage. Some polygons include data for both trees and non-tree vegetation, in which case this field is the sum of canopy cover for forest and nonforest layers combined. Note that it was assumed that no canopy overlap could occur. If overlap was found to be present, the duplicative cover was assigned to the tallest (overtopping) layer. Under this assumption, the sum of layer canopy cover values will never exceed 100 percent (i.e., it is never possible to have more than 100% of the ground surface obscured by foliage or, alternatively, the ground surface can only be obscured by foliage once).

Tree Cover (TreCov): For polygons that include data for both trees and non-tree vegetation (shrubs and/or herbs), this field contains the sum of canopy cover for forest layers only.

Understory Cover (UnCov): For forested polygons with three layers (Layers = 3) and all three layers consist of trees (LayA = 1; LayB = 2; and LayC = 3; see Table 1), understory cover was calculated by summing the canopy cover values for layers B and C (CovB and CovC). Understory cover was needed for the structural class queries (see appendix 3).

Nonviable Overstory (NonOS): A derived field that pertains to forested polygons with an overstory tree layer (layer A) having very sparse canopy cover. A nonviable overstory is defined as any layer A where the canopy cover is 10 percent or less (forested polygons only; does not pertain to nonforest polygons with a tree layer).

Forest (Tree) Density (Density): A derived field that characterizes whether a forested polygon would be considered overstocked or not as evaluated using recent, ecologically based stocking recommendations.[3] The stocking status of each forested polygon was coded as follows:

Code	Description
O	Open (not considered to be overstocked)
D	Dense (would be considered as overstocked)

Remnant Trees Per Acre (RemTPA): During the 1990 Forest-wide contract, the number of remnant trees per acre was recorded for each forested polygon where it could be determined. Remnant trees have irregular crowns that are usually greater in diameter and taller than the dominant trees for layer 1. It is unknown if this field was updated by the recent south-end contracts.

Canopy Layers (Layers): The number of canopy layers was recorded for all vegetation polygons in the EVG database, as described below:

Code	Description
1	1 layer present
2	2 layers present
3	Three or more layers present

Vegetation tends to occur in layers or strata that relate to the vertical stature (height) of its plant composition. Sometimes, these strata reflect differences in lifeform – trees tend to be taller than shrubs, and shrubs tend to be taller than herbs. In other instances, layering reflects differences in plant development – old trees tend to be taller than mid-age trees, which tend to be taller than young trees (seedlings and saplings). Since layering is important for many reasons, much of the vegetation data in this database is stored by layer. Up to three layers are included in the database for each polygon; table 1 shows the various ways that layer fields can be coded and how to interpret each of the possible combinations.

Layer A (LayA): This field records the most predominant (tallest, or most obvious or apparent) layer for vegetated polygons; this field is blank for administrative or nonvegetated polygons.

Code	Description
1	Most predominant layer supports trees
4	Most predominant layer supports shrubs
5	Most predominant layer supports herbs (grasses or forbs)

Layer A Species (Sp1A, Sp2A, Sp3A): For vegetated polygons, one or more plant species codes were recorded in these fields (ABGR for grand fir; CAGE for elk sedge, etc). Codes are too numerous to include here; refer to the EVG data dictionary for the applicable codes.

Cover for Layer A (CovA): For vegetated polygons, the canopy cover associated with layer A was recorded in this field.

[3] For information about the assumptions and caveats associated with the stocking analysis, see: "Methodology for Forest (Tree) Density Analysis" (March 2001, 5 p.; on file at Umatilla NF Supervisor's Office).

Table 1: Coding combinations for vegetation layer fields and their interpretation.

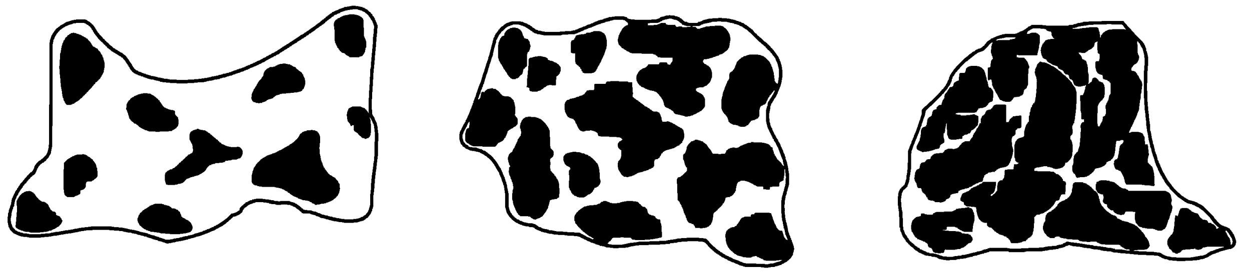
	LAYER A	LAYER B	LAYER C	COMMENT/INTERPRETATION
SINGLE LAYER POLYGONS	1			Trees only
	4			Shrubs only
	5			Herbs only
TWO LAYER POLYGONS	1	2		Trees only
	1	4		Trees over shrubs
	1	5		Trees over herbs
	4	5		Shrubs over herbs
THREE LAYER POLYGONS	1	2	3	Trees only
	1	2	4	Two tree layers over shrubs
	1	2	5	Two tree layers over herbs
	1	4	5	One tree layer over shrubs and herbs

Size Class for Layer A (SizA): For polygons with a forest cover type code, the predominant size class for layer A was recorded using these codes:

Code	**Description**
1	Seedlings; trees less than 1 inch DBH
2	Seedlings and saplings mixed
3	Saplings; trees 1–4.9” DBH
4	Saplings and poles mixed
5	Poles; trees 5–8.9” DBH
6	Poles and small trees mixed
6.5	Small trees 9–14.9” DBH (previous code was 77)
7	Small trees 9–20.9” DBH
7.5	Small trees 15–20.9” DBH (previous code was 88)
8	Small trees and medium trees mixed
9	Medium trees 21–31.9” DBH
10	Medium and large trees mixed
11	Large trees 32–47.9” DBH

Clumpiness for Layer A (ClpA): For polygons with a forest cover type code, intra-stand variability (clumpiness) was recorded using the following codes (note that this data item has had inconsistent coding through time). The diagram below shows three categories of clumpiness.

Code	**Description**
L	Low or widely scattered clump distribution (< 30% of polygon area)
M	Moderate clump distribution (30 to 70% of polygon occupied by clumps)
H	High (dense) clump distribution (> 70% of polygon occupied by tree clumps)
N	Non-clumpy (continuous) distribution
Y	Yes, a clumpy distribution exists



Low Moderate High

Snags for Layer A (SngA): For polygons with a forest cover type code, the predominant snag condition was recorded using these codes (note that this data item has had inconsistent coding through time):

Code	Description
3	Dead trees per acre is 1 to 5
8	Dead trees per acre is 6 to 10
N	No, snags are not apparent on the photography
Y	Yes, snags are apparently present at an unspecified density per acre

Crown Diameter for Layer A (CrwDiaA): For polygons with a forest cover type code, the average crown diameter was recorded for the trees comprising a layer. Apparently, this data item was not maintained during the recent south-end updates and may no longer be consistent for all of the Umatilla National Forest.

Layer B (LayB): This field records the second most predominant (tallest, or most obvious or apparent) layer for vegetated polygons; this field is blank for administrative or nonvegetated polygons.

Code	Description
2	Most predominant layer supports trees
4	Most predominant layer supports shrubs
5	Most predominant layer supports herbs (grasses or forbs)

Layer B Species (Sp1B, Sp2B, Sp3B): For vegetated polygons, one or more plant species codes were recorded in these fields (PSME for Douglas-fir; ACMI for western yarrow, etc). Codes are too numerous to include here; refer to the EVG data dictionary for the applicable codes.

Cover for Layer B (CovB): For vegetated polygons, the canopy cover associated with layer B was recorded in this field.

Size Class for Layer B (SizB): For polygons with a forest cover type code, the predominant size class for layer B was recorded using the same codes described for the 'SizA' field above.

Clumpiness for Layer B (ClpB): For polygons with a forest cover type code, the predominant clumpiness condition was recorded using the same codes described for the 'ClpA' field above (note that this data item has had inconsistent coding through time).

Snags for Layer B (SngB): For polygons with a forest cover type code, the predominant snag condition was recorded using the same codes described for the 'SngA' field above (note that this data item has had inconsistent coding through time).

Crown Diameter for Layer B (CrwDiaB): For polygons with a forest cover type code, the average crown diameter was recorded for the trees comprising a layer. Apparently, this data item was not maintained during the recent south-end updates and may no longer be consistent for all of the Umatilla National Forest.

Layer C (LayC): This field records the third most predominant (tallest, or most obvious or apparent) layer for vegetated polygons; this field is blank for administrative or nonvegetated polygons.

Code	**Description**
3	Most predominant layer supports trees
4	Most predominant layer supports shrubs
5	Most predominant layer supports herbs (grasses or forbs)

Layer C Species (Sp1C, Sp2C, Sp3C): For vegetated polygons, one or more plant species codes were recorded in these fields (ABLA2 for subalpine fir; BERE for Oregon grape, etc.). Codes are too numerous to include here; refer to the EVG data dictionary for the applicable codes.

Cover for Layer C (CovC): For vegetated polygons, the canopy cover associated with layer C was recorded in this field.

Size Class for Layer C (SizC): For polygons with a forest cover type code, the predominant size class for layer C was recorded using the same codes described for the 'SizA' field above.

Clumpiness for Layer C (ClpC): For polygons with a forest cover type code, the predominant clumpiness condition was recorded using the same codes described for the 'ClpA' field above (note that this data item has had inconsistent coding through time).

Snags for Layer C (SngC): For polygons with a forest cover type code, the predominant snag condition was recorded using the same codes described for the 'SngA' field above (note that this data item has had inconsistent coding through time).

Crown Diameter for Layer C (CrwDiaC): For polygons with a forest cover type code, the average crown diameter was recorded for the trees comprising a layer. Apparently, this data item was not maintained during the recent south-end updates and may no longer be consistent for all of the Umatilla National Forest.

Polygon Area (Acres): Total acreage within the polygon boundary; calculated using the Arc GIS software. Note that private land (areas not owned by the Umatilla NF) is delineated as separate polygons; national forest system lands and private lands are not intentionally mixed within the same polygon. During construction of the GIS polygon coverage, certain polygons created by union and intersect processes were smaller than a minimum manageable size. Any of these 'slivers' smaller than two acres were merged with their most similar adjacent neighbor.

Elevation (Elev): A derived field that provides the mean elevation of the polygon, in feet; calculated using the Arc GIS software and based on a 30-meter digital elevation model (DEM). Value is an average of the 30-meter DEM cells located within a polygon.

Slope Percent (Slope): A derived field that provides the mean slope gradient of the polygon, in percent; calculated using the Arc GIS software and based on a 30-meter digital elevation model (DEM). Value is an average of the 30-meter DEM cells located within a polygon.

Aspect (Asp1; Asp2): A derived field that provides the mean aspect of the polygon; calculated using the Arc GIS software and based on a 30-meter digital elevation model (DEM). Value is an average of the azimuth calculations, in degrees, for the 30-meter DEM cells located within a polygon. The azimuth value (Asp1) was converted to a compass direction (Asp2) using this relationship:

Code	**Description**
LE	Level (sites with no aspect; slope percents <5%)
NO	North (azimuths >338° and ≤23°)
NE	Northeast (azimuths >23° and ≤68°)
EA	East (azimuths >68° and ≤113°)
SE	Southeast (azimuths >113° and ≤158°)
SO	South (azimuths >158° and ≤203°)
SW	Southwest (azimuths >203° and ≤248°)
WE	West (azimuths >248° and ≤293°)
NW	Northwest (azimuths >293° and ≤338°)

Slope Curvature (Curv1; Curv2): A derived field that relates to the concavity or convexity of a land surface. The values of curvature can range between –14 and +14 with most areas on the landscape falling between –4 and +4. Curvature is a relative measure where negative values represent concave surfaces and positive values are convex landforms. As values approach zero, the terrain becomes flat (smooth). This field can help identify areas that contain swales, valleys, and ridgetops. As was the case for elevation, aspect, and slope percent, this field is derived from 30-meter DEMs using Arc's grid functionality. The numeric curvature value (Curv1) was converted to a surface configuration code (Curv2) using this relationship:

Curv1 Value	**Curv2 Description**
<-2	Highly concave polygons (Hconcave)
<-1	Concave polygons (Concave)
<1	Flat/smooth polygons (Flat)
<2	Convex polygons (Convex)
≥2	Highly convex polygons (Hconvex)

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APPENDIX 1: EVG MEETING SUMMARY

On Wednesday, November 10, 1999, a meeting was held at Supervisor's Office of Umatilla National Forest to discuss issues relating to an EVG (existing vegetation) database system. This document summarizes primary discussion points from the meeting, and describes any decisions that were made.

This EVG meeting was attended by the following individuals: Alan Ager, Lea Baxter, Bill Collar, Mike Hines, Don Justice, Andrew Lacey, Shirley Lorentz, Dave Powell, Earle Rother (meeting facilitator), and Randall Walker.

MEETING OBJECTIVES. EVG users had previously met in March and May of 1999 to continue a long-running dialogue centered primarily on usability of EVG. At earlier meetings, an important discussion topic was an issue of mixing different data sources – not only within the same EVG table, but also within the same records for an individual polygon (a polygon is a distinct area on the ground for which vegetation information is derived). A primary objective of this EVG meeting was to continue discussions from last spring, particularly regarding an issue of mixing different data sources in EVG.

HISTORICAL SITUATION. Historically, Umatilla National Forest relied on two primary data sources to characterize vegetation – interpretation of aerial photography, and stand examinations. Since PI data is remotely sensed and has limitations regarding the type and range of vegetation attributes that can reliably be determined, it is often considered to be a relatively low-resolution data source. PI data, however, is cost effective, when compared with field surveys, and is useful for analysis of vegetation trends at national forest (Umatilla NF) or biogeographical province (Blue Mountains) scales (see table 1 below).

Table 1: Vegetation data scales.

SCALE	MAIN PURPOSE	RESOLUTION	COVERAGE	DATA SOURCE
Fine	Project Planning	High	Incomplete	Stand Exams
Mid	Ecosystem Analysis	Mixed	Mixed	Mixed (Both)
Broad	Forest Planning	Low	Complete	Remote Sensing (PI/Satellite)

Sources/Notes: Based on a flipchart presented by Alan Ager at an EVG meeting on 11/10/99.

Stand exams are on-the-ground surveys where a series of temporary plots are established in a randomized or grid pattern across a sampled area; vegetation characteristics such as tree diameters and heights are measured on each plot and then summarized to derive an average condition for a polygon. Since individual trees are measured to specific tolerances and measurements then summarized to statistically represent a sampled area (polygon), stand exams are considered to be a high-resolution data source.

The Umatilla's EVG database was initialized in 1989-1990 following a Forest-wide contract to interpret aerial photography acquired in 1987-1988 (some keypunching of contract-supplied information was not completed until early 1991). Some nonforest PI data was initially refined by using historical range surveys; all information pertaining to forested polygons was based on photo interpretation exclusively.

EVG was designed to store summary information about vegetation polygons. It was never intended that EVG would serve as a repository for 'raw' or non-summarized vegetation measurements. A Region 6 stand exam system provides capability to store individual tree records, but no way to store a calculated summary such as per-acre totals of basal area or trees. For this reason, several iterations of a computer program (initially called SLAVES or SLEDS; now called Super Stand) were developed to summarize stand exam information. These programs were used to generate a 'flat file' containing stand (polygon) level summary data, which was then used to update EVG.

Within a few years of EVG's installation on Umatilla National Forest, PI data began to be updated with stand exam summaries. These updates occurred primarily because stand exams were considered to be a higher-resolution data source (e.g., more accurate and more precise) and therefore reflected on-the-ground conditions better than PI information. In many instances, however, stand exams were older than PI information they replaced, so it could not be assumed that stand exams were always the most current survey available.

CURRENT SITUATION. Early in 1999, EVG was used to put together a vegetation database for the Umatilla/Meacham ecosystem analysis area on Walla Walla Ranger District. It took more than six months to construct a usable database! Eventually, it became clear that several different situations contributed to an unacceptably long timeframe for database construction:

1. Stand exam and PI data had been mixed together for the same EVG polygon. This situation occurred because some PI information was retained when making a stand exam update. Not only did this result in two significantly different data sources being intermixed for a single polygon, but it proved particularly troublesome when on-the-ground conditions had changed between the two surveys (PI information may have pertained to a mature stand, whereas a stand exam could have been a stocking survey following regeneration harvest).
2. This data mixing was problematic for several reasons. PI and stand exam surveys are based on very different protocols and accuracy assessment standards. Characterization of species composition, stand size, and other attributes by combining low- and high-resolution sources within the same polygon creates high risk of 'apples' being mixed with 'oranges.' A major reason for a long timeframe to compile a Umatilla/Meacham database was difficulty in untangling stand exam data (apples) from PI information (oranges). This was an important step because each data source had to be handled differently when manipulating the data.
3. Differing protocols between PI and stand exams resulted in 'orphan' data in EVG. If a PI survey identified a forest polygon as a 3-layered stand, but a stand exam update only identified two layers, then PI data for a third layer remained in the database even though layer 3 had not been updated by a stand exam. In other instances, small calculated values from a stand exam had been rounded down by a summary program and resulting zero values loaded into EVG as blanks, suggesting that a measured variable was absent from a stand (dead trees, for example). 'Orphan' data values had to be addressed before a database could be assembled.

To reiterate, orphan data occurred because EVG-update programs retained some existing PI data when processing a stand-exam update (rather than clearing out all preexisting data first, and then repopulating with update data).

4. As a Umatilla/Meacham vegetation database was assembled, it gradually became clear that one or more EVG update programs (SLAVES, SLEDS, Super Stand) had been operating incorrectly. Why these errors were not discovered sooner is unclear, but what we now know is that for whatever reason, some erroneous stand exam data was loaded into EVG during the last seven or eight years.
   [Note: It was not easy to check these summaries because EVG forced stand exam data into layers, even though it had not been collected that way. Sample trees are not assigned to a layer during a stand exam, and information is not summarized by layer on a printout, so it was difficult to verify EVG update results without making laborious hand calculations.]

In April 1999, Umatilla National Forest was selected as one of two Region 6 participants to help test a new national system called FSVeg (an acronym for Field Sampled Vegetation). FSVeg stores vegetation measurements collected during a stand exam or on Current Vegetation Survey (CVS) plots or other field-based inventories. A Washington Office team from Fort Collins, Colorado visited the Forest during June 1999 (June 21-June 25) to install FSVeg.
[Note: CSE, Common Stand Exam system, is a national stand exam protocol that will replace Region 6's existing stand-exam system; it will be implemented during the 2000 field season. CSE is fully compatible with FSVeg.]

The Forest is now trying to load thousands of historical stand exams into FSVeg, allowing us to continue interacting with the Fort Collins development team. At this point, we are impressed with functionality provided by FSVeg. Once all reports are available, FSVeg will allow us to do much more than just generate a paper printout from stand exam data – we will basically have access to a total *information system* based on field-derived vegetation surveys. This provides more capability than we had before, including an option (currently under development) to generate summary data which could then be used to:

- populate an on-Forest stand summary database (such a database does not exist but, if needed, one could be readily developed in Oracle); OR
- revise or 'repopulate' EVG polygons containing erroneous stand exam data; OR
- populate a national vegetation database called Polyveg once it becomes available (in 2 years?).

MEETING RESULTS. Because of these discussions, the following agreements (decisions) were reached at an EVG meeting convened on November 10, 1999:

1. Due to problems arising from a long history of 'data mixing' (as described above), it was agreed to return to a situation where EVG contains photo-interpretation data only. After implementing this agreement, EVG will reflect the most current PI vegetation data on the Forest, including change detection updates completed over the last few years (contracted reinterpretations for North Fork and Heppner; force-account updates for Pomeroy and Walla Walla).
2. Since PI and stand exams are significantly different data sources, they can also result in dramatically different polygon delineations. For this reason, the polygon layer associated with EVG will reflect PI delineations only. Stand exams will be tracked on a separate GIS

coverage, which can then be linked to FSVeg. This means that an EVG coverage will use EVG as its database, and a stand exam coverage will use FSVeg as its data source.

3. The Forest still has a need to generate summary data (per-acre averages) from stand exams for both project-level planning and mid-scale analysis. For this reason, the Forest will continue to actively interact with a Fort Collins development team to ensure that our summary-data needs can eventually be met by FSVeg. Since FSVeg must be able to generate a summary file for Polyveg anyway, this need has already been identified by the Fort Collins development team.
4. To address future logistical issues associated with these agreements, a small task force was formed. It consists of the following individuals: Bill Collar, Mike Hines, Don Justice, Dave Powell, and Randall Walker. This task force was chartered by the larger group to develop a process to implement the agreements described here. A target date for establishing a final process is January 14, 2000. If not completed by January 14th, implementation of the database and GIS changes would occur between January 14 and June 1, 2000.

Notes Prepared By: DAVE POWELL
November 24, 1999

APPENDIX 2: POTENTIAL VEGETATION CODES FOR UMATILLA NF

Ecoclass	Vegetation Type Code	PAG	PVG
CAC3	PICO SUBALPINE PARKS	Cold Dry UF	Cold UF
CAC5	ABLA2 SUBALPINE PARKS	Cold Dry UF	Cold UF
CAF0	ABLA2-PIAL/POPU	Cold Dry UF	Cold UF
CAG111	ABLA2/CAGE	Cold Dry UF	Cold UF
CAG4	ABLA2/STOC	Cold Dry UF	Cold UF
CDG111	PSME/CAGE	Warm Dry UF	Dry UF
CDG112	Old code; changed to CDG121		
CDG121	PSME/CARU	Warm Dry UF	Dry UF
CDS611	PSME/HODI	Warm Moist UF	Moist UF
CDS622	PSME/SYAL	Warm Dry UF	Dry UF
CDS623	Old code; changed to CDS625		
CDS624	Old code; changed to CDS622		
CDS625	PSME/SYOR	Warm Dry UF	Dry UF
CDS628	PSME/SYAL (FLOODPLAIN)	Warm Wet LSM RF	Wet RF
CDS634	PSME/SPBE	Warm Dry UF	Dry UF
CDS711	PSME/PHMA	Warm Dry UF	Dry UF
CDS722	PSME/ACGL-PHMA	Warm Moist UF	Moist UF
CDS724	PSME/ACGL-PHMA (FLOODPLAIN)	Warm Wet MSM RF	Wet RF
CDS812	PSME/VAME	Warm Dry UF	Dry UF
CDS821	Old code; changed to CDS812		
CDSD	PSME/CELE/CAGE	Warm Dry UF	Dry UF
CEF221	Old code; changed to CES414		
CEF311	ABLA2/STAM	Cool Wet UF	Moist UF
CEF331	ABLA2/TRCA3	Cool Moist UF	Moist UF
CEF332	ABLA2/ATFI	Cold Wet HSM RF	Wet RF
CEF335	PIEN/SETR	Cold Wet HSM RF	Wet RF
CEF391	Old code; changed to CEF412		
CEF411	ABLA2/POPU	Cold Dry UF	Cold UF
CEF412	ABLA2/ARCO	Cool Moist UF	Moist UF
CEG312	ABLA2/CARU	Cool Dry UF	Cold UF
CES131	ABLA2/CLUN	Cool Moist UF	Moist UF
CES221	ABLA2/MEFE	Cold Moist UF	Cold UF
CES311	ABLA2/VAME	Cool Moist UF	Moist UF
CES314	Old code; changed to CES131		
CES315	Old code; changed to CES311		
CES411	ABLA2/VASC	Cold Dry UF	Cold UF
CES414	ABLA2/LIBO2	Cool Moist UF	Moist UF
CES415	ABLA2/VASC/POPU	Cold Dry UF	Cold UF
CGTM	GRASS/TREE MOSAIC	Warm Dry UF	Dry UF
CJG111	JUOC/FEID-AGSP	Hot Moist UW	Moist UW
CJS2	JUOC/ARTRV/FEID-AGSP	Hot Moist UW	Moist UW
CJS321	JUOC/PUTR/FEID-AGSP	Hot Moist UW	Moist UW

ECOCLASS	VEGETATION TYPE CODE	PAG	PVG
CJS41	JUOC/CELE/FEID-AGSP	Hot Moist UW	Moist UW
CJS8	JUOC/ARRI	Hot Dry UW	Dry UW
CLF211	PICO(ABGR)/VAME-LIBO2	Cool Moist UF	Moist UF
CLG11	PICO(ABLA2)/STOC	Cold Dry UF	Cold UF
CLG2	PICO/RHIZOMATOUS GRASSES	Cool Dry UF	Cold UF
CLG21	PICO(ABGR)/CARU	Cool Dry UF	Cold UF
CLG211	Old code; changed to CLS417		
CLM1	PICO GRASS-SEDGE WETLAND	Cold Wet HSM RF	Wet RF
CLM114	PICO/CAAQ	Cold Wet HSM RF	Wet RF
CLM115	PICO/DECE	Cold Wet MSM RF	Wet RF
CLM2	PICO SHRUB/GRASS WETLAND	Cold Wet MSM RF	Wet RF
CLS3	Old code; changed to CLS57		
CLS4	Old code; changed to CLS417		
CLS411	Old code; changed to CLS418		
CLS415	PICO(ABLA2)/VASC/POPU	Cold Dry UF	Cold UF
CLS416	PICO/CARU	Cool Dry UF	Cold UF
CLS417	PICO(ABGR)/VASC/CARU	Cold Dry UF	Cold UF
CLS418	PICO(ABLA2)/VASC	Cold Dry UF	Cold UF
CLS5	Old code; replaced by 6 codes		
CLS511	Old code; changed to CLS513		
CLS512	PICO(ABGR)/VAME/CARU	Cool Moist UF	Moist UF
CLS513	PICO(ABGR)/VAME	Cool Moist UF	Moist UF
CLS514	PICO(ABLA2)/VAME	Cool Moist UF	Moist UF
CLS515	Old code; changed to CLS514		
CLS519	PICO(ABGR)/VAME/PTAQ	Cool Moist UF	Moist UF
CLS57	PICO(AGBR)/ARNE	Cool Dry UF	Cold UF
CLS58	PICO(ABGR)/ALSI	Cool Very Moist UF	Moist UF
CLS591	Old code; changed to CLS512		
CLS592	Old code; changed to CLF211		
CLS593	Old code; changed to CLS519		
CLS594	Old code; changed to CLS514		
CLS6	Old code; changed to CLS58		
CPG111	PIPO/AGSP	Hot Dry UF	Dry UF
CPG112	PIPO/FEID	Hot Dry UF	Dry UF
CPG131	Old code; changed to CPG112		
CPG132	Old code; changed to CPG111		
CPG221	PIPO/CARU	Warm Dry UF	Dry UF
CPG222	PIPO/CAGE	Warm Dry UF	Dry UF
CPM111	PIPO/ELGL	Warm Dry UF	Dry UF
CPS221	PIPO/PUTR/CARO	Warm Dry UF	Dry UF
CPS222	PIPO/PUTR/CAGE	Warm Dry UF	Dry UF
CPS226	PIPO/PUTR/FEID-AGSP	Hot Dry UF	Dry UF
CPS232	PIPO/CELE/CAGE	Warm Dry UF	Dry UF
CPS234	PIPO/CELE/FEID-AGSP	Hot Dry UF	Dry UF
CPS511	PIPO/SYAL (FLOODPLAIN)	Hot Dry LSM RF	Dry RF

ECOCLASS	VEGETATION TYPE CODE	PAG	PVG
CPS522	PIPO/SYAL	Warm Dry UF	Dry UF
CPS523	PIPO/SPBE	Warm Dry UF	Dry UF
CPS524	Old code; changed to CPS522		
CPS525	PIPO/SYOR	Warm Dry UF	Dry UF
CWC811	ABGR/TABR/CLUN	Cool Wet UF	Moist UF
CWC812	ABGR/TABR/LIBO2	Cool Wet UF	Moist UF
CWF311	ABGR/LIBO2	Cool Moist UF	Moist UF
CWF312	Old code; changed to CWF311		
CWF421	ABGR/CLUN	Cool Moist UF	Moist UF
CWF422	Old code; changed to CWC811		
CWF444	ABGR/ARCO	Cold Dry UF	Cold UF
CWF512	ABGR/TRCA3	Cool Very Moist UF	Moist UF
CWF611	ABGR/GYDR	Cool Very Moist UF	Moist UF
CWF612	ABGR/POMU-ASCA3	Cool Very Moist UF	Moist UF
CWG1	Old code; changed to CWF444		
CWG111	ABGR/CAGE	Warm Dry UF	Dry UF
CWG112	ABGR/CARU	Warm Dry UF	Dry UF
CWG113	Old code; changed to CWG112		
CWG211	ABGR/BRVU	Warm Moist UF	Moist UF
CWS211	ABGR/VAME	Cool Moist UF	Moist UF
CWS212	Old code; changed to CWS211		
CWS321	ABGR/SPBE	Warm Dry UF	Dry UF
CWS322	Old code; changed to CWS321		
CWS412	ABGR/ACGL-PHMA	Warm Moist UF	Moist UF
CWS541	Old code; changed to CWS912		
CWS543	ABGR/ACGL (FLOODPLAIN)	Warm Wet MSM RF	Wet RF
CWS811	ABGR/VASC	Cold Dry UF	Cold UF
CWS812	ABGR/VASC-LIBO2	Cool Moist UF	Moist UF
CWS912	ABGR/ACGL	Warm Very Moist UF	Moist UF
FM9113	ERUM (RIDGE)	Hot Dry UH	Dry UH
FW5121	VERAT	Warm Wet MSM RH	Mod SM RH
GA10	BRTE	Hot Dry UH	Dry UH
GB41	AGSP-POSA3	Hot Dry UH	Dry UH
GB4111	AGSP-ERHE	Hot Dry UH	Dry UH
GB4118	AGSP-POSA3-OPPO	Hot Dry UH	Dry UH
GB4911	AGSP-POSA3-DAUN	Hot Dry UH	Dry UH
GB4912	AGSP-FEID (DEEP/GENTLE)	Warm Moist UH	Moist UH
GB4913	AGSP-POSA3 (SHALLOW/STEEP)	Hot Dry UH	Dry UH
GB4914	AGSP-FEID (DEEP/STEEP)	Warm Moist UH	Moist UH
GB50	FEID	Warm Moist UH	Moist UH
GB59	FEID-AGSP	Warm Moist UH	Moist UH
GB5917	FEID-AGSP-BASA	Warm Moist UH	Moist UH
GB5921	FEID-CAHO	Warm Moist UH	Moist UH
GB5922	FEID-CAGE	Warm Moist UH	Moist UH
GB9111	POSA3-DAUN	Hot Dry UH	Dry UH

ECOCLASS	VEGETATION TYPE CODE	PAG	PVG
GM4111	CACA	Warm Wet MSM RH	Mod SM RH
GS10	STOC	Cool Moist UH	Cold UH
GS11	FEVI	Cold Moist UH	Cold UH
GS12	FEID (ALPINE)	Cold Moist UH	Cold UH
GS39	CAGE	Cold Dry UH	Cold UH
GS3911	CAGE (ALPINE)	Cold Dry UH	Cold UH
GS3912	CAHO	Cool Moist UH	Cold UH
HAS211	ALRU/PHCA3	Warm Wet MSM RF	Wet RF
HCS112	POTR2/SALA2	Hot Dry MSM RF	Dry RF
HCS113	POTR2/ALIN-COST	Warm Wet MSM RF	Wet RF
HCS114	POTR2/ACGL	Warm Wet MSM RF	Wet RF
HQM122	POTR/POPR	Hot Dry LSM RF	Dry RF
HQM211	POTR/CALA3	Warm Wet MSM RF	Wet RF
MD3111	POPR	Warm Wet LSM RH	Low SM RH
MM1912	DECE	Warm Wet MSM RH	Mod SM RH
MM2911	CALA3	Warm Wet MSM RH	Mod SM RH
MM2912	CANE	Hot Dry MSM RH	Mod SM RH
MM2916	CALU	Cold Wet HSM RH	High SM RH
MM2924	SCMI	Warm Wet HSM RH	High SM RH
MM2925	GLEL	Warm Wet HSM RH	High SM RH
MS20	Old code; changed to MM2916		
MS3111	CASC5	Cold Wet HSM RH	High SM RH
MW3912	JUBA	Hot Dry MSM RH	Mod SM RH
NTS111	PHLE2 (TALUS)	Talus	Nonvegetated
SD1911	ARAR/FEID-AGSP	Hot Dry US	Dry US
SD2911	ARTRV/FEID-AGSP	Warm Moist US	Moist US
SD2915	ARTRV/CAGE (MONTANE)	Warm Moist US	Moist US
SD2916	ARTRV-PUTR/FEID	Hot Moist US	Moist US
SD2917	ARTRV-SYOR/BRCA	Warm Moist US	Moist US
SD3111	PUTR/FEID-AGSP	Warm Moist US	Moist US
SD3112	PUTR/AGSP	Hot Moist US	Moist US
SD40	CELE/CAGE	Hot Moist US	Moist US
SD4111	CELE/FEID-AGSP	Hot Moist US	Moist US
SD65	GLNE/AGSP	Hot Dry US	Dry US
SD70	CHNA	Hot Dry US	Dry US
SD9111	ARRI/POSA3	Hot Dry US	Dry US
SD9221	ARAR/POSA3	Hot Dry US	Dry US
SD93	ERIOGONUM spp.	Hot Dry US	Dry US
SM1111	PHMA-SYAL	Warm Moist US	Moist US
SM19	PHMA	Warm Moist US	Moist US
SM20	ALSI	Cold Very Moist US	Cold US
SM29	Old code; changed to SM1111		
SM30	PREM-HODI	Warm Moist US	Moist US
SM31	Old code; changed to SM3111		
SM3111	SYAL	Warm Moist US	Moist US

Ecoclass	Vegetation Type Code	PAG	PVG
SM32	SYOR	Warm Moist US	Moist US
SM33	CEVE	Warm Moist US	Moist US
SS4911	ARTRV/CAGE (ALPINE)	Cold Moist US	Cold US
SW1117	SAEX	Hot Dry MSM RS	Dry RS
SW2118	ALIN/CADE	Warm Wet MSM RS	Wet RS
SW2211	ALIN-SYAL	Warm Wet LSM RS	Wet RS
SW2216	ALIN-COST/MESIC FORB	Warm Wet MSM RS	Wet RS
SW5113	POFR/DECE	Warm Wet MSM RS	Wet RS
Admin	Administrative site		Admin
CA	Subalpine fir forest series		Moist/Cold UF
CD	Douglas-fir forest series		Dry/Moist UF
CE	Engelmann spruce forest series		Moist/Cold UF
CJ	Western juniper forest series		Moist UW
CP	Ponderosa pine forest series		Dry UF
CW	Grand fir forest series		Dry/Moist/Cold UF
FM	Moist forblands		Dry/Moist UH
FX	Other forblands		Dry/Moist/Cold UH
GA	Annual grasslands		Dry/Moist UH
GB	Bunchgrass grasslands		Dry/Moist/Cold UH
GM	Moist grasslands		Moist UH
GS	Subalpine grasslands		Cold UH
GX	Other grasslands		Dry/Moist/Cold UH
HC	Black cottonwood forest series		Moist UF
MD	Dry meadow		Dry UH
MM	Moist meadows		Moist/Cold UH
MM30	Short sedges		High SM RH
MS	Subalpine meadows		Cold UH
MS25	Forbs		Mod SM RH
MT	Tule meadows		Moist UH
MW10	Sedges over 12 inches		Mod SM RH
MW20	Sedges under 12 inches		Mod SM RH
NF	Nonvegetated flood plains		Nonvegetated
NM	Mining/dredge tailings	Talus	Nonvegetated
NR	Rock	Rock	Nonvegetated
NRAO	Subalpine rock	Rock	Nonvegetated
NRCO	Ledge/cliff/rock face	Rock	Nonvegetated
NT	Talus	Talus	Nonvegetated
NTAO	Subalpine talus	Talus	Nonvegetated
PVT	Private land		PVT
SD	Dry shrublands		Dry US
SM	Moist shrublands		Moist/Cold US
SS	Subalpine shrublands		Moist/Cold US
ST	Tall shrublands		Dry US
SW	Wet shrublands		Cold US

ECOCLASS	VEGETATION TYPE CODE	PAG	PVG
SX	Other shrublands		Dry/Moist/Cold US
WL	Lake/pond	Water Lake	Water
WR	Flowing water	Water River	Water

APPENDIX 3: METHODOLOGY FOR DERIVING FOREST STRUCTURAL CLASSES FOR EVG DATABASE

PVG	Order	SizA	CovA	UnCov	SizB	Class	Remarks
COLD UPLAND FOREST	1	≥ 7.5	≥ 30	> 20		OFMS	Size class 7.5 included to account for LP and SF types
	2	≥ 7.5	≥ 30	≤ 20		OFSS	Size class 7.5 included to account for LP and SF types
	3	≥ 5	> 60	≥ 10		UR	
	4	≥ 5	>10, ≤ 60	≥ 10		YFMS	Differs from Hessburg; they used: CovA ≥ 10%, ≤ 60
	5	≥ 5	> 70	< 10		SECC	
	6	≥ 5	>10, ≤ 70	< 10		SEOC	*Note*: > 10% CovA was not used by Hessburg et al. 1999
	7	< 5	> 10			SI	Overstory consists of seedlings and saplings
	8		≤ 10	<10		SI (BG)	Total tree cover (TreCov) is less than 10%
	9	[≥ 5]	[≤ 10]	≥ 10	< 5	SI	Nonviable overstory; understory is seedlings and saplings
	10	[≥ 5]	[≤ 10]	≥ 30	≥ 7.5	OFSS	Nonviable overstory; query based on understory data
	11	[≥ 5]	[≤ 10]	>70	≥ 5	SECC	Nonviable overstory; query based on understory data
	12	[≥ 5]	[≤ 10]	≤ 70	[≥ 5]	SEOC	Nonviable overstory; query based on understory data
MOIST UPLAND FOREST	1	≥ 8	≥ 30	> 20		OFMS	
	2	≥ 8	≥ 30	≤ 20		OFSS	
	3	≥ 5	> 60	≥ 10		UR	
	4	≥ 5	>10, ≤ 60	≥ 10		YFMS	Differs from Hessburg; they used: CovA ≥ 10%, ≤ 60
	5	≥ 5	> 70	< 10		SECC	
	6	≥ 5	>10, ≤ 70	< 10		SEOC	*Note*: > 10% CovA was not used by Hessburg et al. 1999
	7	< 5	> 10			SI	Overstory consists of seedlings and saplings
	8		≤ 10	<10		SI (BG)	Total tree cover (TreCov) is less than 10%
	9	[≥ 5]	[≤ 10]	≥ 10	< 5	SI	Nonviable overstory; understory is seedlings and saplings
	10	[≥ 5]	[≤ 10]	≥ 30	≥ 8	OFSS	Nonviable overstory; query based on understory data
	11	[≥ 5]	[≤ 10]	>70	≥ 5	SECC	Nonviable overstory; query based on understory data
	12	[≥ 5]	[≤ 10]	≤ 70	[≥ 5]	SEOC	Nonviable overstory; query based on understory data

PVG	Order	SizA	CovA	UnCov	SizB	Class	Remarks
DRY UPLAND FOREST	1	≥ 8	≥ 15	≥ 10		OFMS	*Note*: Except for SI, the Dry UF queries used ½ of the CovA values used for the Cold and Moist UF queries
	2	≥ 8	≥ 15	< 10		OFSS	
	3	≥ 5	> 30	≥ 10		UR	
	4	≥ 5	>10, ≤ 30	≥ 10		YFMS	Differs from Hessburg; they used: CovA ≥ 10%, ≤ 30
	5	≥ 5	> 35	< 10		SECC	
	6	≥ 5	>10, ≤ 35	< 10		SEOC	*Note*: > 10% CovA was not used by Hessburg et al. 1999
	7	< 5	> 10			SI	Overstory consists of seedlings and saplings
	8		≤ 10	<10		SI (BG)	Total tree cover (TreCov) is less than 10%
	9	[≥ 5]	[≤ 10]	≥ 10	< 5	SI	Nonviable overstory; understory is seedlings and saplings
	10	[≥ 5]	[≤ 10]	≥ 15	≥ 8	OFSS	Nonviable overstory; query based on understory data
	11	[≥ 5]	[≤ 10]	>35	≥ 5	SECC	Nonviable overstory; query based on understory data
	12	[≥ 5]	[≤ 10]	≤ 35	[≥ 5]	SEOC	Nonviable overstory; query based on understory data

Sources/Notes: Based on Hessburg et al. 1999 (page 47); deviations from their queries are noted in the remarks. Order is important for these calculations because if a polygon could meet more than one query option, a structural class code should be assigned by the option with the lowest order number. Items in brackets are provided for information only; they are not necessary when using “blank, changeto” query statements <u>in this order of precedence</u>. Note that structural classes for woodlands were also based on Hessburg et al. 1999 (page 57).

APPENDIX 4: 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…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
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

Paper #	Title
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

December 2016: The first version of this white paper (22 p.) was prepared in January 2001 during implementation of changes to the Forest's vegetation database systems (white paper F14-SO-WP-SILV-2 describes Composite database, another vegetation application used on Umatilla NF). This update reformatted the original white paper into a contemporary style by adding a first page 'white paper' header, assigning a white paper number, and adding a new appendix describing a silviculture white paper system.