Region One
Vegetation Classification, Mapping, Inventory and Analysis Report

$\bar{x} = \frac{\sum x}{n}$

Report 19-7 v6.3 **April 11, 2019**

Region 1 Common Stand Exam and
Inventory and Monitoring Field Guide

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A Administrative and Proclaimed National Forest Codes
B District Codes
C State Codes
D County Codes
E Existing Vegetation Composition References and Codes
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H List of Species
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R Damage Categories, Agents, Severity Ratings, and Tree Parts
S Down-Woody Materials
T Tolerances for Region 1 Common Stand Exam/Inventory and Monitoring
U Fuel Model
V Glossary of Terms

Region 1 CSE/IM Field Guide Supplemental Appendices:

R1 – A Deriving Statistical Accuracy for Stand Exam Design (This section has been moved to the R1 SUPPLEMENT TO NATIONAL FSVEG/CSE USER'S GUIDE Chapter 2: Preparation and Design.)
R1 – B Region 1 Sample Designs
R1 – C Juniper Allegro
R1 – D Supplemental Data Collection Forms
R1 – E Measuring Tree Canopy Cover
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R1 – G Plot Establishment (IM)
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Region 1 Damage Descriptions

Section 1: Data Collection Procedures

This document outlines attributes and data collection protocols for Common Stand Exams (CSE) and Inventory and Monitoring (IM), hereafter referred to as the R1 CSE/IM Field Guide.

In general, this document focuses on Common Stand Exams because stand exams are the most common protocols used for data collection, by a Forest. See *R1 Supplement to National FSVeg/CSE User's Guide Chapter 2: Preparation and Design* for an overview of the steps to follow to prepare for, implement, clean, and load stand exam data.

Common Stand Exams generally are conducted on stands, a contiguous group of trees sufficiently uniform in size class distribution, composition, and structure, and growing on a site of sufficiently uniform quality, to be a distinguishable unit, such as mixed, pure, even-aged, and uneven-aged stands. A stand is the fundamental unit of silviculture reporting and record-keeping (FSM 2470.5). The polygon associated with the exam is delineated and maintained in FSVeg Spatial. It is expected that FSVeg Spatial stand delineations are reviewed and updated to represent the area over which the plots were selected and sampled, if needed, prior to data collection. Exams conducted on polygons that are not delineated *stands* in FSVeg Spatial need to be clearly identified as such by using a "P" in the location field (see Item 2.5, Setting Form) which results in a setting id that does *not* follow the standard stand naming convention used in R1. Contact the R1 field protocols specialist if further information or guidance is needed.

If information needs dictate that attributes will be remeasured over time, then the IM protocols and associated Exams software are used. These protocols allow additional attributes to be collected which assist with relocating plots and trees from measurement to measurement. **It is critical for Forests considering implementing an inventory and subsequent monitoring project using IM protocols to contact the R1 Analysis Team with sufficient time for the Analysis Team to help with project design, protocols, and subsequent data analysis**. Inventory plots remeasured over time require significant investment and good to ensure high quality data for analysis. Protocols particular to IM are followed by (IM) in this manual and in the R1 CSE/IM Field Guide Supplemental Appendices. See the following table to find detailed information on IM specific attributes, Exams forms, templates and protocols.

IM Specific Information	Location of Documentation
Activating the .im option in Exams	12.2.2 Inventory and Monitoring Option in ExamsPC (IM)
Tree azimuth and Tree distance	5.29 and 5.30 under Tree Data
Witness Tree/Plot Navigation Form	R1 CSE/IM Field Guide Supplemental Appendix G

Fire Information Observation Form	R1 CSE/IM Field Guide Supplemental Appendix H
IM Field Forms	R1 CSE/IM Field Guide Supplemental Appendix D
Customizable IM Field Protocols (Intensified Grid, FIA Midcycle Remeasure, etc.)	Contact R1 Analysis Team http://fsweb.r1.fs.fed.us/forest/inv/cse_exams/cse_template.shtml
IM Exams Templates (Intensified Grid, FIA Midcycle Remeasure, etc.)	Contact R1 Analysis Team

As discussed in Section 1.2, there are three examination levels, Intensive Exam, Extensive Exam, and Quick Plot Exam. Data collection requirements and accuracy standards vary depending on examination level. The allowable range of measurement or classification error is termed the "tolerance". Data item tolerance limits are indicated throughout this manual and in the R1 CSE/IM Field Guide Appendix T. The Exam Level indicates the minimum attributes collected. Information needs may dictate adding additional attributes, especially to the tree form.

1.1 Region 1 Required Fields

The following fields are "**required**" in Region 1 regardless of examination level.
Note: Depending on the purpose for a specific exam, the examination level may vary for different forms, or some forms may not be collected.

Form	CSE Attrib # (Exams PDR Sheet #)	Setting Form Required Fields
Setting	2.1(1)	Project Name
	2.2(1)	Proclaimed Region
	2.3(1)	Proclaimed Forest Number
	2.4(1)	District
	2.5(1)	Location (compartment / subcompartment)
	2.6(1)	Stand Number
	2.11(2)	Date
	2.12(2)	Examination Level
	2.14(2)	Exam Purpose
	2.18(2)	Potential Vegetation Reference
	2.19(2)	Potential Vegetation (Habitat Type)
	2.21(3)	Setting Capable Growing Area
	2.23(3)	Setting Elevation

Form	CSE Attrib # (Exams PDR Sheet #)	Setting Form Required Fields
	2.24(3)	Setting Aspect
	2.25(3)	Setting Slope
	2.27(3)	Acres
	2.35(4)	Datum (Lat/Long)
	2.28(4)	Examiner
	2.29(4)	Precision Protocol

The following table shows the minimum requirements for each CSE/IM Form and where additional information on each Forms can be found.

Form	Required fields	Reference within
Sample Design	Sample design specified according to exam objectives	• Section 3: Sample Design Form - All Exam Levels • 12.3.2 Entering/Editing Sample Design Data • Region 1 Sample Design examples, R1 Supplementary Appendices, Section B
Plot	Plot Number	Section 4: Plot Data Form – All Exam Levels
	Plot Aspect	
	Plot Slope	
	Plot Latitude	
	Plot Longitude	
	Plot Potential Vegetation	
Veg Comp	Optional- Exam level indicates what is required, based on exam objectives	Section 6: Vegetation Composition and Ground Surface Cover Forms – All Exam Levels
Ground Surface	Optional dependent upon exam objectives	
Down-woody materials	Optional form; minimum attributes to collect to meet Brown's Protocols to calculate fuel loadings are listed below.	Section 7: Down-Woody Materials Form – All Exam Levels
	First Duff	

Form	Required fields	Reference within
	Second Duff	
	1-hour (.01 - .24 inch)	
	10-hour (.25 - .99 inch)	
	100-hour (1.0 – 2.9 inch)	
	Piece Count (3.0+ inch diameter)	
	Log Decay Class (3.0+ inch diameter)	
	Diameter (3.0+ inch diameter)	

1.2 Exam Levels for the Tree Form

There are three examination levels: (3) Intensive Exam, (2) Extensive Exam, and (1) Quick Plot Exam. The Intensive Exam has the tightest tolerance standards, data collection requirements, and required accuracy. The Extensive Exam has less collection requirements and accuracy. Measurement tolerances, data collection requirements, and required accuracy for the Quick Plot Exam are relaxed to allow for rapid inventory procedure.

Data needs determine the examination level required. When data needs can be minimized and/or when data estimations and/or attribute groupings can provide acceptable levels of information, the Extensive Exam and Quick Plot Exam offer the greatest opportunity for cost savings. A major cost component for any exam is travel time and locating the stand and/or plots; therefore, it may be worthwhile to increase the exam intensity level so that a reliable, full characterization of the stand may be made now and in future analysis. In addition, if non-required fields are collected to supplement an Extensive Exam or Quick Plot Exam, the cost savings may be reduced to the point that there is little significant cost difference compared to an Intensive Exam. See the Setting Form, Item 2.13, for a list of the minimum attributes to collect by Exam Level of the Tree Form.

The reliability of an estimate is determined by how homogeneous the setting is and the number of plots that are measured. For a detailed discussion on determining the number of plots to install in order to meet the exams information needs, see R1 CSE/IM Field Guide Supplemental Appendix R1-A.

1.2.1 Intensive Tree Exam

An Intensive Exam is designed to have accurate tree measurements collected to tight tolerance standards. It provides a comprehensive inventory for stands. Trees on the large tree plot are recorded individually. Trees on the small plot may be recorded in groups, with the exception of growth sample trees. Diameters of live trees are measured to the nearest 0.1 inch. Tree heights are measured to the nearest foot. Growth sample trees (GST) are used to objectively select trees for additional measurements that are

expensive to collect, such as radial or height growth, ages and heights. These measurements allow for relationships to be made base on the GST trees, so non-GST trees can have those attributes "dubbed in" during the compilation process. This provides a complete data set to meet reporting needs.

Barring any disturbances, this type of exam has the longest "shelf life" in FSVeg and is the best type of data to input into the Forest Vegetation Simulator (FVS). Intensive exams should have enough plots installed to provide an estimate that has a sampling error of 20% or less at the 90% confidence level for the primary attribute of interest (see 2.14, Exam Purpose).

Exam Purpose (SE or CI): When taking any level of examination that includes the Tree Data Form, and the EXAM PURPOSE (Item 2.14) is code "SE" or "CI" (Stand Exam or Stratified Random Sample / Compartment Inventory), all size classes of trees found in the stand must be sampled.

1.2.2 Extensive Tree Exam

An Extensive Exam is designed to have accurate tree measurements collected to tolerance standards tighter than a Quick Plot Exam, but not as tight as an Intensive Exam. Trees above 3.0-inches in diameter are recorded individually. Trees on the small tree plot may be recorded in groups. Some tree defect information is collected. No growth or age measurements are required. This limits the ability to assess old growth, to develop age class tables, and to calibrate growth functions in FVS. Extensive exams should have enough plots to provide an estimate for the primary attribute of interest (see 2.14, Exam Purpose), that has a sampling error of 20% or less at the 80% confidence level.

1.2.3 Quick Plot Tree Exam

The Quick Plot Exam is a rapid inventory procedure. Data needs determine the design of the Quick Plot Exam. Tree data may be grouped by species, diameters, heights, and/or damage classes on both the large and small plots. At a minimum, the Quick Plot Exam provides a statistically describable estimate of stocking by certain critical tree categories. Examinations may be custom designed in order to satisfy specific stand data needs for prescription development or for use as supplemental cruise plots. The selection of the Quick Plot Exam must be made on the basis of the type of stand to be evaluated and associated decisions that must be made. Quick plot exams should provide an estimate for the primary attribute of interest (see 2.14, Exam Purpose), that has a sampling error of 20% or less at the 68% confidence level.

1.3 Appendices

The CSE/IM appendices are the same as the *National FSVeg/CSE User's Guide* appendices except:

- They only contain information pertinent to Region 1 procedures.

The Region 1 CSE/IM Supplemental Appendices have additional information/specifications for data collection in Region 1 that are not documented in the national appendices.

Section 2: Setting Form - Intensive / Extensive Exam Levels

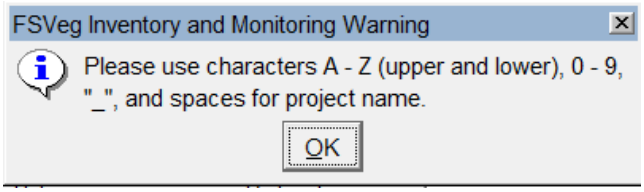
The combination of Region, Proclaimed Forest, District, Location, Stand, Purpose Code, and Measurement Date fields uniquely identifies an exam associated with a setting.

The tolerance limits listed for items in this section are for the **Intensive** and **Extensive** examination levels. Attributes that don't have a tolerance specified in this section should be defined at the project level, in the protocol or contract, based on project specifications. See Appendix T, Tolerances for Region 1 Common Stand Exam/Inventory and Monitoring, for a table of tolerances by form and attribute.

The examination level indicated on the Tree Data Form determines the examination level of the Setting Form.

2.1 Project Name (25-character) *Required*

Record the project name. Multiple settings may have the same project name. Special characters and periods (".") are not valid in project names and will cause the following pop-up error in FSVeg when trying to view the data.



- **Tolerance** (Project Name): No Errors

2.2 Proclaimed Region (2-digit) *Required*

Record "1" for Region 1.

- **Tolerance** (Proclaimed Region): No Errors

2.3 Proclaimed National Forest (2-digit) *Required*

Proclaimed Forest is the forest code that FSVeg currently has populated in the Proclaimed Forest field. Is used in the creation of the Setting Id in FSVeg and is part of linkage between exam data in FSVeg and the stand delineation in FSVeg Spatial.

The following Proclaimed* National Forest Codes are used in R1:

Forest #	Forest Name	Forest #	Forest Name
02*	Beaverhead-Deerlodge	11	Gallatin
03	Bitterroot	12	Helena
04*	Idaho Panhandle	14*	Kootenai

05	Clearwater	15	Lewis & Clark
08	Custer	16	Lolo
10	Flathead	17	Nez Perce

*Prior to migration to FSVeg, R1 used TSMRS and R1 Edit to manage stand information. Those databases did not discern between Administrative and Proclaimed Forest. Therefore, when migrating to FSVeg and FSVeg Spatial, both Administrative and Proclaimed National Forest were populated with the Forest number being used in 2000. So, Proclaimed Forest is not necessarily the congressionally mandated Forest number but the Forest number that is in FSVeg and FSVeg Spatial in the Proclaimed Forest field and was used by the Region in 2000, the date of data migration from the legacy database.

- **Tolerance** (Proclaimed National Forest): No Errors

In order to check the Proclaimed Forest associated with a stand in FSVeg Spatial, run the R01 Extract Vegetation Polygons record set writer in the Geospatial Interface. For more information see *Geospatial Interface Content: FSVeg and FSVeg Spatial.*

2.4 District (2-digit) *Required*

Record the 2-digit District code associated with the District. These District numbers *should not* be updated over time due to forest consolidation. They are the District numbers that were used when the Forest stand layer was migrated to FSVeg Spatial in 2010 based on the TSMRS District codes used in 2005. Refer to R1 CSE/IM Field Guide Appendix B for a list of District Codes.

- **Tolerance** (District): No Errors

In order to check the District associated with a stand in FSVeg Spatial, run the R01 Extract Vegetation Polygons record set writer in the Geospatial Interface, for more information see *Geospatial Interface Content: FSVeg and FSVeg Spatial.*

2.5 Location (16-character) *Required*

Record the Location (Compartment/Subcompartment) associated with the Proclaimed National Forest. These Location codes *should not* be updated, over time, due to forest consolidation. They are the Location codes that were used when the forest stand layer was migrated to FSVeg Spatial in 2010 based on the TSMRS District codes used in 2005.

In order to check the District, associated with a stand in FSVeg Spatial, run the R01 Extract Vegetation Polygons record set writer in the Geospatial Interface, for more information see *Geospatial Interface Content: FSVeg and FSVeg Spatial.*

In Region 1, Common Stand Exams are generally conducted on *stands* (see Section 1) whose associated polygon is delineated and managed in FSVeg Spatial. These exams should have a 4-character LOCATION code comprised of a 2-digit “compartment” code

plus a 2-digit "subcompartment" code. This will yield a **Setting ID** in FSVeg of RR//FF//DD//CC//SS//TTTT (R=region, F= *proclaimed* forest, D=district, C=compartment, S=subcompartment, T=stand) and it will be named consistent with the stand polygons in FSVeg Spatial.

Exams conducted on polygons that are not coincident with delineated *stands* in FSVeg Spatial (see Section 1) need to be clearly identified as such by using a capitol "P" in the location field following the 2-digit "compartment" code and 2-digit "subcompartment" code. This will yield a setting id in FSVeg of RR//FF//DD//CC//SSP//TTTT.

- **Tolerance** (Location): No Errors

2.6 Stand Number (4-digit) *Required*

Record the stand number consistent with the current **FSVeg Spatial stand number** or a number associated with the polygon if a "P" is used in the location field.

In order to check a Stand Number, associated with a stand in FSVeg Spatial, run the R01 Extract Vegetation Polygons record set writer in the Geospatial Interface, for more information see *Geospatial Interface Content: FSVeg and FSVeg Spatial.*

- **Tolerance (Stand Number):** No Errors

2.7 Owner (4-character)

Record "USFS" for the Forest Service.

- **Tolerance** (Owner): No Errors

2.8 State (2-character)

Record the STATE code identifying where the setting area is located. Settings that cross state boundaries must be subdivided.

Code	Description	Code	Description
ID	Idaho	SD	South Dakota
MT	Montana	WA	Washington
ND	North Dakota		

- **Tolerance** (State): No Errors

2.9 County (3-digit)

For Region 1, record the 2-digit COUNTY code identifying where the setting area is located. Refer to R1 CSE/IM Field Guide Appendix D for a list of County Codes.

- **Tolerance** (County): No Errors

2.10 Administrative Forest (2-digit)

This field is used to record the Administrative Forest code. This code has been updated in response to forest consolidation for both the Nez Perce-Clearwater, the Custer-Gallatin, and the Helena-Lewis and Clark National Forests.

Administrative Forest Codes in R1 are as follows:

Forest #	Forest Name	Forest #	Forest Name
02	Beaverhead-Deerlodge	14	Kootenai
03	Bitterroot	15	Helena-Lewis & Clark
04	Idaho Panhandle	16	Lolo
10	Flathead	17	Nez Perce-Clearwater
11	Custer-Gallatin		

- **Tolerance (Administrative Forest):** No Errors

2.11 Date (8-digit) *Required*

Record the calendar month, day, and year that the stand examination is completed, using the following format: MMDDYYYY.

- **Tolerance** (Date): No Errors

2.13 Examination Level (4-digit) *Required*

Record the examination level that identifies the scope and range of information being collected. Scope is the breadth of information collected and range is the accuracy of information collected.

The examination level may vary for different forms. The examination level indicated on the Tree Data Form determines the examination level of the Setting and Plot Data forms, but it does not necessarily indicate the examination level that is selected for the Vegetation Composition Form. See Section 1.2 for additional information on Exam Level.

- **Tolerance** (Examination Level): No Errors

2.13.1 Tree Data Examination Level

For the **Tree Data Form**, enter one of the following codes to indicate the examination level. Listed are required fields for the Tree Data Form by Exam Level. You may add additional attributes but the Exam Level indicates the *minimum* attributes that are required.

	Exam Level		
Attribute	1 (Quick Plot)	2 (Extensive Plot)	3 (Intensive Plot)
Plot Number	X	X	X

	Exam Level		
Attribute	1 (Quick Plot)	2 (Extensive Plot)	3 (Intensive Plot)
Tag Number	X	X	X
Tree Status	X	X	X
Tree Class			
GST Tree			X
Tree Species	X	X	X
Tree Count	X	X	X
Number of Stems	N/A	N/A	N/A
DBH	Trees ≥ 4.5 ft tall	Trees ≥ 4.5 ft tall	Trees ≥ 4.5 ft tall
Height	Trees < 4.5 ft tall	Trees < 4.5 ft tall	GST, trees < 4.5 ft tall, trees with broken tops
Height to Crown			
Radial Growth			GST only
Radial Growth 2	N/A	N/A	N/A
Height Growth			GST only
Tree Age			GST only
Crown Ratio	X	X	X
Crown Class		X	X
Crown Width			
Wildlife Use			
Cone Serotiny			
Tree Damage Category		X	X
Tree Damage Agent			X
Tree Damage Part			
Tree Damage Severity		X	X
Snag Decay Class	X	X	X
Remarks			
Tree User Code			
Tree Treatment Option			
Azimuth of Tree (IM)			
Horizontal Distance (IM)			

2.13.2 Vegetation Composition Examination Level

For the **Vegetation Composition Form**, enter one of the following codes to indicate the examination level. The exam level determines the type of vegetation composition that will be collected.

Veg. Exam Level Code	Items to record	Subpop Min. *	Subpop Max.	Cover by Lifeform (Form 1)	Cover by Species and Layer (Form 2)**	Cover by Species (Form 3)
0	Vegetation Composition is not collected, form is not used					
1	• Lifeform Cover % • Layer (tree/shrub)	Not applicable		Required	Not Applicable	Not Applicable
2	• Lifeform Cover % • Layer (tree/shrub) • Cover recorded for designated species (≥ min. %)*	User defined	100	Required	• Optional, not generally used in R1 • "Designated" species that meet minimum cover criteria	"Designated" species that meet minimum cover criteria (subpop min)
3	• Lifeform Cover % • Layer (tree/shrub) • Cover recorded for all species (≥ min. %)*	User defined	100	Required	• Optional, not generally used in R1 • All species that meet minimum cover criteria	*All species that meet minimum cover criteria (subpop min)
4	• Lifeform Cover % • Layer (tree/shrub) • Cover recorded for all species (≥ min. %)* • Designated Species	User defined	100	Required	• Optional, not generally used in R1 • All species that meet minimum cover criteria (subpop min) • Presence of *all* "designated" species	• All species that meet minimum cover criteria designated in subpop min* • Presence of all "designated species"

* Subpopulation minimum values are determined by the user based on information needs of the exam

** For Vegetation Composition Exam Level of 2, 3, or 4; Form 2 or Form 3 must be collected. In R1, Form 2, Cover by Species and Layer is rarely used.

2.13.3 Down Woody Material Examination Level

For the **Down-Woody Materials Form**, enter one of the following codes to indicate the Examination Level.

Down-Woody Materials	
Exam Level Code	Description
2	**Brown's Protocol** Collected according to Brown's Protocols. See DWM protocols in Section 7. • *All* components of Brown's are collected • Sample Design Selection Method = 'TRN' • Reports compute tons per acre • Data is available in FVS input files and in R1 Stand Exam Summary Database
1	**Piece Count** option, collected on a transect • *A subset* of the DWM components are collected along a transect. Generally Forests will only collect information on down-woody material above a certain diameter threshold. • Sample Design Selection Method = 'TRN' • Tons per acre calculated for components collected • Data is available in FVS input files and in R1 Stand Exam Summary Database but does *not* represent the fuel loading of the stand
1	Piece Count option, collected on fixed-radius plot Contact Field Protocol Specialist if you are considering using this method. • Sample Design Selection Method = 'FRQ' • Down-woody material is collected on Fixed radius plot • Tons per acre *not calculated* and data is *not* available in FVS • Note: this method is not supported in R1. If you feel that piece count is important, collect according to Exam Level 2 and collect Large-end Diameter (Item 7.12). This will allow for pieces per acre to be calculated.

Down-Woody Materials	
Exam Level Code	Description
1	**Photo Series** Collect custom weight classes by down-wood diameter classes. **Note:** This Exam Level is used when fuel loadings in a setting are not accurately represented by a single photo within in the photo series guide, ie various DWM size classes are associated with tons per acre taken from more than one photo. This method allows use of size class specific fuel loadings values from multiple photos within a fuel photo series guide. This information is not translated into FVS or the R1 Stand Exam Summary Database. See protocols in Down-Woody Material, Section 7, for detailed information. • Collected using photo series guides, but recording tons per acre by fuels classes from different photos within the guide. • *Do Not* use this Exam Level if assigning each plot to a specific photo, use the Residue Description Code on the Plot Form • *Do Not* record values in the Residue Description Code in the Plot Form. *****If each plot is being assigned to a **single photo**, do not use this option. Set the down-woody material Exam Level to 0 and input phot information into Residue Description Code collected on the Plot Form (Item 4.13). See DWM Exam Level 0, below.
0	Not Collected or Not Collected on the Down-Woody Materials Form • No fuel data is collected or • Fuel Photo Series is collected in Residue Description Code on Plot Form (Item 4.13). This is used when assigning each plot to a single photo (data sheet). Make sure that Residue Description Code is a selected field in Plot Field Selections. Record Fuel Photo Reference on the Setting Form (2.33 Fuel Photo Reference (3-digit)). Data is available in FVS input database.

2.13.3 Ground Surface Cover Examination Level

The **Ground Surface Cover Form** (Form 4 of the Vegetation Composition|Ground Surface Cover Data) is accessible through the Vegetation Composition Form. The Exam Levels for the Ground Surface Cover Form are defined in the table below.

Ground Surface Cover	
Exam Level Code	Description
1	Surface Cover is collected.
0	Not Collected

2.14 Exam Purpose (2-character) *Required*

There are seven EXAM PURPOSE codes that are currently used in Region 1 associated with data collection: **SE, CI, FI, RP, IM, LI** or **RE** (codes described below). The Exam Purpose codes identify the following aspects related to the sampling design and/or analysis capabilities of the data collected:

- **Sample Accuracy (BA/TPA)** – the reliability of the exam in estimating basal area, trees per acre, or the vegetation attribute of interest
- **Sample Intensity (Tree)** – the extent to which sample trees, representative of the entire population of size classes found in a stand/setting, have been included in the overall sample design.
- **Sample Selection** – the method used to select stands for measurement
- **Sample Type** – whether the exam is an intensification of the FIA grid or a polygon-based stand exam

Exam Purpose Codes	Name	Description
SE	Stand Exam	General statistically valid stand exam
CI	Stratified Random Sample (Compartment Inventory)	Stands are selected for examination based on probability of selection proportional to size of stand
RP	All other exams	Exams do not meet sample accuracy standards, or do not sample all trees in the stand, or the plots were not systematically sampled.
FI	FIA Midcycle Remeasure, R1 Intensified Grid	Work with R1 Analysis team if you plan to use this purpose code.
IM	Inventory and Monitoring	Plots are monumented and will be remeasured over time.
RE	Stocking Surveys	Used with R1 Stocking Survey Protocol.
LI	Lidar training data	Training data for lidar acquisition only. See R1 Analysis Team if you plan to use this purpose code.

2.14.1 Exam Purpose Guidelines:

Use the guidelines and definitions listed below to determine which EXAM PURPOSE to select. Record the code that identifies the purpose selected.

1. **Stand Exam (SE), or Stratified Random Sample (CI).** A stand exam's purpose is to collect reliable information on vegetation attributes. Oftentimes, the primary attributes of interest are tree related, but not always. An exam purpose of SE or CI must first meet criteria a, b, and c to ensure reliable information:

   a. **Sample Accuracy (BA/TPA)** – A 20% Sampling Error at the:
      - 90% Confidence Level was achieved for Intensive Exams (Tree data, Exam Level 3)
      - 80% Confidence Level was achieved for Extensive Exams (Tree data, Exam Level 2)
      - 68% Confidence level was achieved for Quick Plot Exams (Tree data, Exam Level 1)
        - Common attributes of interest for accuracy levels include:
          - Basal Area per acre (BA),
          - Trees per acre (TPA) – trees per acre calculated on trees above breakpoint diameter (if the quadratic mean diameter is greater than breakpoint diameter), OR trees per acre based on the trees below breakpoint diameter (if the quadratic mean diameter is less than breakpoint diameter)
          - Or the vegetation attributes of interest to meet information needs for the exam. For example, an old growth exam may have sample accuracy based on the trees per acre that are 9" dbh and larger.

The number of plots installed in the stand is related to the accuracy of the exam. It is understood that a 20% error may not always be achieved. However, an R1 FSVeg report will be provided which reports the error, at various confidence levels, for various attributes of interest. See the *R1 Supplement to National FSVeg/CSE User's Guide Chapter 2: Preparation and Design* for additional information).

   b. **Sample Selection (Tree)** – All live trees ≥ 1 foot tall, and all dead trees ≥ 3 inches diameter, are measured or tallied.

   c. **Plot Selection** – The plots were systematically sampled with a random start or randomly located throughout the stand.

If all of the criteria listed above are true then use either:

SE - Stand Exam, to indicate that stand selection for sampling was dictated by local data needs.

CI – Stratified Random Sample (Compartment Inventory), to indicate that stand selection for sampling was based on random selection of stand polygons with probability proportion to size (acres) in the context of stratified random sampling or compartment inventory design. Forests that are using a stratified random sample which randomly selects stands should be working with the R1 Vegetation Analysis Team to ensure that data is collected and warehoused appropriately so it will be available for analysis.

2. **Other Exam Purposes (RP).** If any of the previous criteria are NOT met (e.g., an ocular macroplot is being collected, only down-woody fuel information is recorded, only snag information is collected, biased plot location), then the exam purpose code of **RP – must be used.**

3. **Inventory and Monitoring (IM).** This code is to be used for inventory and monitoring purposes where plots will be revisited and remeasured over time. It is expected that Regional Protocols for installation and measuring over time will be followed. Work with the R1 Analysis Team when setting up this sampling scheme to ensure that trend data over time is available to meet monitoring needs.

4. **Stocking Surveys (RE).** This code is to be used with R1 stocking survey protocols, *Common Stand Exam Protocols for Stocking Surveys*.
5. **Forest Inventory (FI).** An exam purpose of FI indicates that the exam is a grid-based exam following protocols defined in the **Region 1 Intensified Grid Field Procedures Using Inventory and Monitoring Protocols** manual. This code indicates that data are not for base-level stand exam analysis, but are a spatially balanced sample of plots across a larger geographic area of interest. This code is also used for R1 projects that measure FIA grid plots between FIA measurements, such as measuring FIA grid plots after wildfire events and/or insect outbreaks. **Contact the R1 Analysis Team to set-up sampling methods and protocols for these inventories.**

6. **Lidar (LI).** This cold is used when collecting training data associated with Lidar acquisition. Work with the R1 Analysis Team prior to using this Purpose Code to ensure that training data can be tied to Lidar data during analysis.

❖ **Tolerance** (Exam Purpose): No Errors

2.15 Stratum (6-character)

Record the current STRATUM for the setting area. Refer to aerial photo typing or other stratification information associated with the polygon. Forest direction dictates the list of strata definitions and codes used.

2.16 Existing Vegetation Reference (3-character) *Generally not used in R1*
Record the code identifying the reference used to obtain the dominant EXISTING VEGETATION COMPOSITION TYPE (Item 2.17) for the setting area. Refer to the R1 CSE/IM Field Guide Appendix E for a complete list of valid reference codes.

- **Tolerance** (Existing Vegetation Reference): No Errors

2.17 Existing Vegetation Composition Type (3-character) *Generally not used in R1*
Record the code for the current (not potential) vegetative or non-vegetative type dominating the setting area. Dominance is based on plurality of basal area. Refer to the R1 CSE/IM Field Guide Appendix E for a complete list of EXISTING VEGETATION COMPOSITION TYPE codes. Dominance type as per R1 Existing Vegetation Classification System (Barber and others, 2011), are calculated on all exam data loaded into FSVeg so collecting this attribute may not be needed.

2.18 Potential Vegetation Reference (3-character) *Required*
Record the code identifying the reference used to obtain the POTENTIAL VEGETATION (habitat type) for the setting area; refer to Item 2.19. Only one POTENTIAL VEGETATION REFERENCE code may be selected per examination.
Note: POTENTIAL VEGETATION REFERENCE 111 is used in stands that have potential vegetation codes from both *Forest Habitat Types of Montana* (Pfister, et al., 1977) and *Forest Habitat Types of Northern Idaho: A Second Approximation* (Cooper, et al., 1991).

Refer to the R1 CSE/IM Field Guide Appendix F for a list of potential vegetation references used in Region One and a list of what forest each reference can be used on. This appendix includes non-forest references primarily used for special projects and intensified grid exams. If you are conducting timber based stand exams, you will likely be using 101, or 110.

- **Tolerance** (Potential Vegetation Reference): No Errors

2.19 Potential Vegetation (8-digit) *Required*
Record the code for the predominant POTENTIAL VEGETATION (habitat type) to phase for the setting area. Potential vegetation is the community that develops over time, primarily influenced by soil and climate. It represents the area in a climax or near-climax condition. POTENTIAL VEGETATION for the setting area is determined by the predominant POTENTIAL VEGETATION found in the stand. Refer to R1 CSE/IM Field Guide Appendix G for a complete list of POTENTIAL VEGETATION codes.

- **Tolerance** (Plot Potential Vegetation): Accurate to R1 Habitat Type Group. See Table 2 in *R1 Forested Potential Vegetation Group Crosswalk, Region 1 Existing and Potential Vegetation Groupings used for Broad-level Analysis and Monitoring* (Milburn et al. 2015) unless specified otherwise for the project.

2.20 Structure (2-character)

Record one of the following codes that best describes the overall structure of the setting. STRUCTURE describes the distribution of tree-size classes within the stand. **Note:** Vertical structure is calculated as per R1 Existing Vegetation Classification System (Barber and others, 2011) for all inventory data so this attribute does not need to be recorded on all exam data loaded into FSVeg. Collecting this attribute may not be needed.

Code	Description
SS	**Single story** - A single even canopy characterizes the setting. The greatest number of trees are in a height class (or diameter class) represented by the average height class (or diameter class) of the setting; there are substantially fewer trees in height/diameter classes above and below this mean.
TS	**Two-storied** - Two relatively even canopy levels can be recognized in the setting. The frequency distribution of trees by height class (or diameter class) tends to be bimodal. Understory or overtopped trees are common. Neither canopy level is necessarily continuous or closed, but both canopy levels tend to be distributed across a predominance of the setting (e.g., overstory with regenerated understory).
MS	**Multi-storied** - At least three height-size classes are commonly represented in the setting. In general, the canopy is broken and uneven although multiple canopy levels may be distinguishable. The various size classes tend to be uniformly distributed throughout the setting.
MO	**Mosaic** - At least two distinct height size classes are represented; these classes are not uniformly distributed, but are grouped in small repeating aggregations, or occur as stringers less than two chains wide, throughout the setting. Each size class aggregation is too small to be recognized and mapped as an individual setting.
UA	**Unknown/un-assessable** - A structure classification was attempted, but the stand did not fit into one of the pre-defined categories. Note in the remarks column the reason the stand could not be classified.

2.21 Setting Capable Growing Area (3-digit) *Required*

Estimate the percent of the setting area capable of supporting trees. Make deductions for areas such as roads, creeks, swamps, rock outcrops, etc. For example, if an area contains 5% rock outcropping and 10% road, record 85% for SETTING CAPABLE GROWING AREA.

- **Tolerance** (Setting Capable Growing Area): ± 10 percent

2.22 Setting Fuel Model (2-digit)

Record the predominant fuel model for the setting determined by the predominant Fuel Model in the stand, refer to PLOT FUEL MODEL (Item 4.12). See the R1 CSE/IM Field Guide Appendix U for Fuel Model codes. It is highly recommended that individuals collecting this data first obtain the appropriate training.

Note: If FUEL MODEL data are the only fuels related information collected (e.g., it is collected instead of Brown's Protocols), record "0" for EXAMINATION LEVEL (Item 2.13) on the Down-Woody Materials Form.

This information is translated into FVS if collected.

2.23 Setting Elevation (5-digit) *Required*

Record the predominant setting elevation, to the nearest foot.

❖ **Tolerance** (Setting Elevation): ± 100 feet

2.24 Setting Aspect (3-digit) *Required*

Record the average or predominant aspect for the setting area (to the nearest degree, 0° to 360°). Setting aspect is the general direction toward which the setting faces. Setting aspect may be determined from contour maps or by taking compass readings directly down slope at various places within the setting.

SETTING ASPECT coding guidelines:

- If aspect changes gradually across the setting, record an average aspect.
- If aspect changes across the setting, but is predominately of one direction, code predominate direction, rather than the average.
- If the setting falls on or straddles a canyon bottom or narrow ridge top, code the aspect of the ridgeline or canyon bottom.
- If the setting falls on a canyon bottom or on a narrow ridge top, but most of the area lies on one side hill, code the aspect of the side hill.

Examples:

Aspect Code	Description
0	Flat
183	183°
360	360°
999	Indeterminate/No predominant aspect/Undulating

❖ **Tolerance** (Setting Aspect): ± 45 degrees

2.25 Setting Slope (3-digit) *Required*

Record the average or predominant slope for the setting area (to the nearest 1 percent).

SETTING SLOPE coding guidelines:

- If slope changes gradually across the setting, record an average slope.
- If slope changes across the setting, but the slope is predominately of one direction, code the predominant slope percentage rather than the average.
- If the setting falls directly between two side hills, code the average slope of the side hill(s).
- If the setting falls on a canyon bottom or on a narrow ridge top, but most of the area lies on one side hill, code the slope of the side hill.

❖ **Tolerance** (Setting Slope): ± 10 percent

2.26 Setting Slope Position (2-character)

Record the position of the setting on the landscape as defined below. Slope position definitions from: *National Soil Survey Handbook (Title 430-VI). 1993. USDA Soil Conservation Service.*

Code	Description
SU	**Summit/Ridgetop/Plateau**. The topographically highest hillslope position of a hillslope profile and exhibiting a nearly level surface.
SH	**Shoulder**. The hillslope position that forms the uppermost inclined surface near the top of a hillslope. It comprises the transition zone from backslope to summit.
BS	**Backslope**. The hillslope position that forms the steepest inclined surface and principle element of many hillslopes. In profile, backslopes are commonly steep, linear, and bounded by a convex shoulder above and descending to concave footslope. They may or may not include cliff segments. Backslopes are commonly erosional forms produced by mass movement and running water.
FS	**Footslope**. The hillslope position that forms the inner, gently inclined surface at the base of a hillslope. In profile, footslopes are commonly concave. It is a transition zone between upslope sites of erosion and transport.
TS	**Toeslope**. The hillslope position that forms the gently inclined surface at the base of a hillslope. Toeslopes in profile are commonly gentle and linear, and are constructional surfaces forming the lower part of a hillslope continuum that grades to a valley bottom.
VB	**Valley Bottom**. Wide valley bottom beyond influence of toeslope.

❖ **Tolerance** (Setting Slope Position): ± 1 class

2.27 Acres (4-digit) *Required*

Record the total setting acres.

❖ **Tolerance** (Acres): No Errors

2.28 Examiner (15-character) *Required*
Record the name and/or crew number for the individual(s) responsible for data collection. **Do not use reserved characters such as +, /, -, or * in this field.**

❖ **Tolerance** (Examiner): No Errors

2.29 Precision Protocol (6-character) *Required*
Record the code for the precision protocol used. The PRECISION PROTOCOL code is determined by the purpose of the exam and examination level of the **Tree Data Form.**

Exam Purpose Code	Examination Level of the Tree Form	Precision Protocol Code
SE, CI, RP	Intensive (3)	CSE
SE, CI, RP	Extensive (2)	CSE_E
SE, CI, RP	Quick Plot (1)	CSE_Q

The default PRECISION PROTOCOL "CSE" follows the CSE guidelines specified in this document for Extensive and Intensive Exams. If any type of tree diameters and/or tree heights will be "grouped" in any manner not outlined in this manual, or if any of the precision protocols deviate from the standard CSE protocols, contact your CSE Regional Representative to discuss how to reflect these modifications in the PRECISION PROTOCOL. Alternate protocols do not affect the per acre values, but will provide information about the "precision" level of measurements. Refer to the *National FSVeg/CSE User's Guide* for details on the Precision Protocols.

❖ **Tolerance** (Precision Protocol): No Errors

2.30 Radial Growth Interval (2-digit)
Record the time period used for measuring radial growth. Default is 10 years (code "10"). Do not modify this interval.

❖ **Tolerance** (Radial Growth Interval): No Errors

2.31 Radial Growth Interval 2 (Not Used Region 1)

2.32 Height Growth Interval (2-digit)
This variable indicates the time period associated with the height growth measurements. It is automatically set to 5 years (code "5"). DO NOT modify this interval.

❖ **Tolerance** (Height Growth Interval): No Errors

2.33 Fuel Photo Reference (3-digit)

If a fuel photo series (refer to Item 4.12) is used to determine fuel loadings for each plot, record the FUEL PHOTO REFERENCE code in this field. Refer to the R1 CSE/IM Field Guide Appendix I for a complete list of fuel photo references and codes.
Note: Also, record the corresponding fuel photo series number (RESIDUAL DESCRIPTIVE CODE, Item 4.13) on the Plot Data Form. Record "0" for EXAMINATION LEVEL on the Down-Woody Materials Form (Item 2.13) if this is the only fuels attribute being collected.

❖ **Tolerance** (Fuel Photo Reference): No Errors

2.34 Setting User Code (4-character)

This is a user defined field that can be used to collect additional information. This information will not be used in any of the R1 Reports and Utilities.

2.35 Setting Lat Long Reference Datum *Required*

NAD83 is the Datum used in R1 for all inventory data locations. NAD 1983 was officially adopted as the legal horizontal datum for the United States by the Federal government (Federal Register, Vol. 54, No. 113, page 25318, June 1989).

❖ **Tolerance** (Setting Lat Long Reference Datum): No Errors

Note: Ensure GPS Datum is set to NAD83 prior to collecting any GPS spatial locations.

2.36 Magnetic Declination (IM) *Required for IM:*

Magnetic Declination is only required for IM projects where plots will be revisited and remeasured over time. Magnetic Declination is helpful when remeasuring:

- Tree data on the Tree Form (IM)
- Horizontal Cover using the R1 CSE/IM Field Guide Supplementary Appendix R1-I protocols, since cover board placement is dependent on azimuth (IM)
- Transects placed based on specified azimuths, for example down woody material transects.

Record the declination that is set on the compass used to measure azimuth. Note: All crew members taking azimuth need to have compasses set to the same declination.

❖ **Tolerance** (Magnetic Declination): No Errors

2.37 Measurement Number (IM) *Required for Inventory and Monitoring*

For installation, use measurement number 1. The measurement number, for subsequent measurements will automatically be updated when the previous measurement is being downloaded from FSVeg into Exams.

❖ **Tolerance** (Measurement Number): No Errors

Note: Fields 2.38 – 2.42 are separate items under the Setting Data menu in Exams.

2.38 Setting Remarks (242-character)
Use this section to record remarks about setting conditions not already described elsewhere (do not record remarks already recorded on other forms). For example, include comments concerning the overall health of a stand, regeneration, minor habitat types, wildlife observations, site disturbances, unusual circumstances that impacted data collection, etc.

2.39 Setting Damage Category (2-digit)
Record damage seen within the setting that was not recorded as tree damages on the Tree Form (Item 5.22) or in the Plot History (Item 4.16) field. Refer to the R1 CSE/IM Field Guide Appendix R for a complete list of damage category codes.

- **Tolerance (Setting Damage Category):** No Errors – if damage is present in the stand in the immediate area adjacent to the plot, or on the direct access route and is not represented in Tree Damage Category (Item 5.22) or Plot History.

2.40 Setting Damage Agent (3-digit)
If a SETTING DAMAGE CATEGORY (Item 2.39) is recorded, record a corresponding damage agent code. Refer to the R1 CSE/IM Field Guide Appendix R for a complete list of all damage agent codes.

- **Tolerance** (Setting Damage Agent): Locally specified – if found in stand and not represented in Tree Damage Agent (Item 5.23) or Plot History.

2.41 Setting Damage Severity (2-character)
If a SETTING DAMAGE CATEGORY (Item 2.40) is recorded, record a corresponding damage severity code. Refer to the R1 CSE/IM Field Guide Appendix R for a complete list of all damage severity codes (use the setting severity codes where indicated).

- **Tolerance** (Setting Damage Severity): Locally specified – if found in stand and not represented in Tree Damage Severity Item 5.25) or Plot History.

2.42 Species of Management Interest (8-character)
Record PLANTS codes to indicate the occurrence of species of management interest that occur in the setting, but have not been recorded on the Tree Data Form or the Vegetation Composition Form. Species of Management Interest may include noxious weeds, threatened, endangered, sensitive plants, or management indicator species. Up to 10 species may be entered per stand. Note the approximate location of these species in the setting SKETCH MAP AND TRAVERSE NOTES (Item 2.43). This field is only an indication of the presence of a Species of Management Interest. To determine the extent of the occurrence, another exam may need to be conducted.

2.43-2.44 Fire Information/Observations (IM)
This form is used to enter fire information, individual observation sites, fire behavior information, fire weather information, fuel and fuel model information and parameters,

and fuel moisture parameters. This form is accessed via the Setting Record Form when the Exam Purpose is set to FF, which indicates exams that monitor the effects of fire over time. If you are interested in using this field, contact the R1 Analysis Team for information. The Fire Information/Observation Form can also be accessed from the Setting Data dropdown menu. Data fields in this form are discussed in the R1 CSE/IM Field Guide Supplemental Appendix R1-H.

Section 3: Sample Design Form - All Exam Levels

The tolerance limits for all items in this section are “No Errors” and apply to all sample designs and examination levels.

Complete the Sample Design information within the Exams Software template file which reflects how the information, on each population that is being sampled, will be selected. **Note**: each setting added to an Exams software file will default to the sample design residing in the template file.

In general, the sample design within a project will vary little from stand to stand. The Sample Design Form will only need to be updated if one of the attributes within the template is different, for example Sample Expansion Factor when Selection Method is BAF.

Sample Design Selection: Sample designs may be selected from the Region 1 examples; see R1 CSE/IM Field Guide Supplemental Appendix R1-B. If a sample design is desired, but not listed, contact the R1 Inventory Coordinator for assistance.

3.1 Form Type (10-character)

The Sample Design Form type is selected by clicking on the tab at the top of the Sample Design Form page in Exams software. **NOTE:** the Exam Level of the Setting Form, Item 2.13, determines which Forms are enabled for data collection. It doesn’t matter if there is a default sample design in a form that is not being used, because the Exam Level determines which forms will be turned on. Any sample design information for forms that are turned off by the Exam Level will be ignored while loading data into FSVeg.

Form Type (Population of Interest)	Description
Tree	Tree Data Form
Veg. Composition	Vegetation Composition Form
Ground Surface Cover	Ground Surface Cover Form
Down Woody Material	Down-Woody Materials Form

Screenshot of Sample Design Form with Sample Design Type Tabs

Tree | Veg. Composition | Ground Surface Cover | Down Woody Material (Brown's Survey)

Meth	ExpFac	Azm	Cond.	SubFiltr	Var	MinV	MaxV	Remarks
FRQ	300.0000		---	LIVE	DBH	0.10	4.99	
			OR	LIVE	HGT	0.50	4.49	
BAF	20.0000		---	ALL	DBH	5.00	999.99	

3.2 Sample Selection Method Type (3-character) *Required*

Record the method by which trees, vegetation composition, ground surface cover, or down-woody materials were selected for sample. The information needs of the inventory will dictate which method is used. FSVeg sampling protocols allow different sampling methods to be used for each lifeform. Contact the R1 Analysis Team if you have specific questions about sampling methods.

Selection Method	Description	Population of interest for Selection Method listed	Discussion of sampling method
FRQ	Fixed area plots, either circular or rectangle	Tree selection	• Small-tree plots for stand exams • Can be used for large-tree plots for stand exams • Often used for both small- and large-tree plots when monitoring changes over time (IM)
		Foliar cover by lifeform, presence of vegetation species, or ground surface cover	• Fast sampling method for sampling plant composition and structure • May not be suitable for monitoring changes over time unless multiple quadrats within a plot are used. Contact R1 Field Protocol Specialist to discuss further.
		Ground Surface Cover	Fast method for Stand Exams. Not appropriate for monitoring changes over time (IM)
BAF	Basal area factor for a horizontal plot sample	Tree selection	• Efficient method of selection for selecting large-trees for stand exams. • Especially good if exam information needs are associated with the larger-diameter trees found in the stand, such as old growth and volume estimates
TRN	Line-intercept method; uses a transect of a fixed length and samples all items in the plane that extends perpendicular to the transect.	Down-woody materials	This is the method used when sampling according to Brown's protocols
		Canopy cover of trees	Most accurate method for measuring canopy cover of trees (IM).

Selection Method	Description	Population of interest for Selection Method listed	Discussion of sampling method
		Canopy cover of shrubs	Used primarily when remeasuring shrubs over time (IM).
TPT	Point-intercept method uses a transect of fixed length and set of sample points at fixed distances along the transect.	Ground surface cover	• Most accurate method for measuring surface cover. • Recommend using when monitoring changes over time (IM).
		Cover of grasses, forbs, and short shrubs	Recommend using when monitoring changes over time (IM).

3.2.1 Plot Size

Tree and vegetation plots or transects should be small, or long, enough to be efficient, but large enough so that averages of the plot estimates give an accurate representation of the cover by lifeforms and, if applicable, include most of the species present within the setting. The sample design, plot size or transect length, and number of plots depend on the purpose of the survey and the characteristics of the vegetation being sampled. Within a stand, all plots of a specific exam type must be the same size. Larger plots are better at capturing overstory (trees) and trace species. Several common plot sizes are shown below. If sampling is consistently missing important species, then a larger plot size should be used.

Transect length can be modified depending on size of trees and variability of tree spacing (or shrubs) within the setting and necessary confidence intervals. Call someone on the Region One Analysis Team if you wish to alter transect length or have implementation questions.

When using the line-intercept method for vegetation transects there are various layout options available. The example below provides two layout options for a transect length of 100'.

- 50 feet extend east and 50 feet west through plot center for even numbered plots and north south for odd numbered plots
- 50 feet extend east and 50 feet extend north for even numbered plots and 50 feet extend west and 50 feet extend south for odd number plots
- start transect at plot center. Extend for 100' along the azimuth that is going to be traveled when locating the next plot.

Some Standard Plot Sizes and Transect Lengths for Sampling Vegetation and Surface Cover

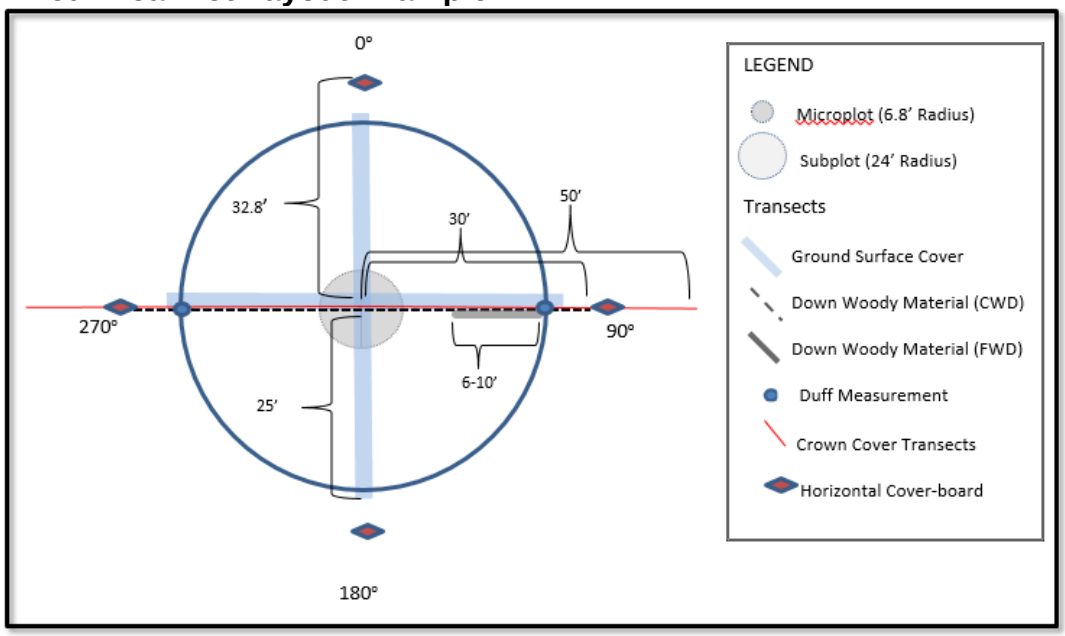
Plot Size (acres)	Vegetation Types
1/100	Regeneration areas

1/50	Riparian shrubland, riparian herbland, alpine vegetation, grassland
1/24	Mimic FIA/INT GRID Protocols
1/10	Low-diversity forest, shrubland, grassland, riparian forest and woodland, riparian large shrubland. Good plot size for broad vegetation composition inventories.
Transect Length (feet)	Lifeform
100'+	Canopy cover of trees
50'	Surface cover

3.2.2 Fixed Area Plot Shape (FRQ)

Circular plots are easiest to install, but the actual plot shape (square, rectangular, or circular) can be customized to suit a specific type of setting. For example, if sampling in riparian areas only, a long, narrow, rectangular plot may be appropriate. If square or rectangular plots are used, record the length and width of the plots in the SAMPLE DESIGN REMARKS field (Item 3.6) and include a sketch in the setting SKETCH MAP AND TRAVERSE NOTES (Item 2.40). Like plot size, all plots within a setting must be the same shape to avoid bias. Plot shape must also be determined prior to initiating sampling for the setting area.

Fixed Area Plot Layout Example



3.3 Sample Expansion Factor (6,1- digit) *Required*

This field corresponds to the SAMPLE SELECTION METHOD TYPE (Item 3.2), and converts data to a per-unit-area basis.

Selection Method	Sample Expansion Factor Interpretation
FRQ	Inverse of the fixed plot, area in acres
BAF	Basal Area Factor
TRN	Length of Transect in Feet
TPT	The number of sampling points along the transect

Note: Acual BAF is used in the Sample Expansion Factor field, not the rounded BAF, for example, when using a rounded BAF of 25 on a relaskop, the Sample Expansion Factor actual BAF of 25.15 is entered. See Appendix K for more information on Relaskop scales and BAF.

Examples:

Selection Method	Sample Expansion Factor	Description
FRQ	20	The per acre expansion factor of a 1/20th acre plot
FRQ	3	The per acre expansion factor of a 1/3rd acre plot
FRQ	.2	The per acre expansion factor of a 5-acre plot
BAF	40	40 basal area factor
TRN	100	The horizontal length of the length of the transect line
TPT	50	The number of points along a transect where vegetation or surface cover information is collected.

3.4 Starting Azimuth (3-digit)

Not used in R1. When the SAMPLE SELECTION METHOD TYPE (Item 3.2) is “TRN,” record the starting azimuth for the transect line. If the azimuth will remain the same for all subsequent plots, or if it will rotate “X” degrees on each plot, write a note in the SAMPLE DESIGN REMARKS (Item 3.6).

3.5 Subpopulation Filter (8-character) *Required*

Record the filter used to define the subpopulation. If an attribute, such as “height,” is used as a subpopulation filter, it MUST be collected on all units measured in the subpopulation.
Note: Leave the SUBPOPULATION FILTER field blank for the Ground Surface Cover Form.

Use the following codes for the filters listed:

Subpopulation Filter	Interpretation	Appropriate Selection Method(s) for Subpopulation Filters listed
LIVE	Live Live trees, live shrubs, etc	FRQ, BAF
DEAD	Dead Dead trees, dead shrubs (this is not dormant)	FRQ, BAF
ALL	Both live and dead	FRQ, BAF
DOWN	Down-woody materials	TRN

3.6 Sample Design Remarks (242-character)

Record information that explains the sample design.

3.7 Selection Criteria Number or Criteria Condition (2-digit) *Required*

Record a sequential number, starting with 1, for each **set** of selection criteria records used to define a unique, mutually-exclusive segment of the population to be sampled. Selection criteria numbers must be unique throughout the inventory.

Exams software – The SELECTION CRITERIA NUMBER field is referred to as "Criteria Condition (Cond.)" in the Exams software Sample Design Form. The Exams software uses the logical operators AND and OR instead of numbers. If two or more selection criteria records have the SAME number, it implies an "AND" relationship, and the records are considered to be a set. If selection criteria records have different numbers, it implies an "OR" relationship, and the records are considered to be unique sets.

Selection Criteria Example:

- On a 20 BAF variable-radius plot, sample all species ≥ 5 DBH
- On a 300th acre fixed-radius plot, sample:
  - Live species < 5 inches DBH
  - Live species between 0.5 and 5.0 feet tall

As shown below, this example requires three different selection criteria:

Sample Design		Selection Criteria					
Selection Method	Sample Expansion Factor	Criteria Condition	Selection Criteria Number	Subpop. Filter	Subpop. Variable	Subpop. Min. Value	Subpop. Max Value
BAF	20	-	1	ALL	DBH	5.0	999.9
FRQ	300	-	2	LIVE	DBH	0.1	4.9

Sample Design		Selection Criteria					
		or	3	LIVE	HGT	0.5	5.0

3.8 Subpopulation Variable (3-character) *Required*
Record the attribute used to define the subpopulations sampled.

Subpop. Variable	Definition	Appropriate Selection Method for Subpop. Variable listed
DBH	Diameter at Breast Height Used for sampling standing trees ≥ 4.5 feet tall.	BAF, FRQ
HGT	Height Used for sampling standing trees (generally trees less than 4.5' tall).	BAF, FRQ
CVR	Vegetation Cover Used for sampling vegetation composition if all lifeforms are selected and sampled in the same manner. This is what is generally done with stand exams.	FRQ
TRE SHR FRB GRM	Vegetation Cover Used when different sampling methods are being used for different lifeforms. These subpopulation variables cannot be used if CVR is being used.	FRQ, TRN. TPT
SVC	Ground Surface Cover Used for sampling ground surface cover.	FRQ, TPT
DIA	Diameter at Midpoint Used for sampling down-woody materials.	TRN

3.9 Subpopulation Minimum Value (4,1- digit) *Required*
Record the minimum value for the subpopulation variables (default value is "0").

3.10 Subpopulation Maximum Value (4,1- digit) *Required*
Record the maximum value for the subpopulation variables (default value is "999.9").

3.11 Sample Design Remarks (25-character)
Enter any remarks about the sample design form.

Section 4: Plot Data Form – All Exam Levels

The required fields and tolerance limits listed in this section pertain to all exam levels. Attributes that don't have a tolerance specified in this section should be defined at the project level, in the protocol or contract, based on project specifications. The examination level indicated on the Tree Data Form determines the examination level of the Plot Data Form.

For each plot in the stand, complete a separate set of plot data.

4.1 Plot Number (3-digit) *Required*

Record PLOT NUMBER for each plot. Plots do not have to be numbered consecutively.

- **Tolerance** (Plot Number): No Errors

4.1.1 Locating Plot Center (GPS Method)

Use the GPS to locate the plot center without bias if theoretical plot coordinates are provided.

Navigate to approximately 50 feet of the plot center according to the GPS using the navigation function. Use the GPS waypoint navigation function to calculate a distance and azimuth to the plot center from where you have stopped. Using a tape and compass, measure the remaining distance to the plot center based on the azimuth and distance calculated by the GPS. Once you reach the distance and azimuth calculated by the GPS, you are at plot center. Acquire your GPS coordinates (see Section 4.2). If they are within tolerance, mark the location with a stick with flagging and lay out your plot.

Refer to R1 CSE/IM Field Guide Supplemental Appendix C for generalized GPS operating instructions and GPS settings. **Note:** Be sure your GPS datum is set to NAD83. NAD 1983 is the legal horizontal datum for the United States by the Federal government (Federal Register, Vol. 54, No. 113, page 25318, June 1989).

4.2 Acquiring GPS Locations

Required – unless technical difficulties prevent satellite reception

Use a global positioning system (GPS) as the primary method to locate plots. See R1 CSE/IM Field Guide Appendix R1-C for instructions on how to connect a Garmin GPS and Juniper Systems Allegro together and auto fill the lat/long fields in the Exams software.

4.2.1 Plot Latitude (8-digit)

Record the latitude for the plot as measured by a GPS. Record as a 8-digit code comprising the following values and in the following order: a 2-digit "degree" value, a 2-digit "minute" value, a 2-digit "seconds" value, and a 2-digit "hundredths of a second" value.

❖ **Tolerance** (Plot Latitude):
- Estimated Horizontal Error: ± 10 meters (32.8 feet)
- Position Error: ± 10 meters (32.8 feet) 85% of the time
- Unless otherwise specified

As a rough approximation, one second latitude equals approximately 101 feet on the ground, 1/10" ≈ 10 feet, and 1/100" ≈ 1.0 feet.

4.2.2 Plot Longitude (9-digit)

Record the longitude for the plot as measured by a GPS. Record as a 9-digit code comprising the following values and in the following order: a 3-digit "degree" value, a 2-digit "minute" value, a 2-digit "seconds" value, and a 2-digit "hundredths of a second" value.

❖ **Tolerance** (Plot Longitude):
- Estimated Horizontal Error: ± 10 meters (32.8 feet)
- Position Error: ± 10 meters (32.8 feet) 85% of the time
- Unless otherwise specified

As a rough approximation, one second longitude in this area is roughly equal to 70 feet on the ground, 1/10 second ≈ 7 and 1/00 second ≈ 0.7 feet.

4.3 Plot Capable Growing Area (3-digit)

PLOT CAPABLE GROWING AREA is used to indicate a *non-stockable* plot within the extent of the large and small-tree plot. A plot is considered non-stockable if it contains ground conditions or vegetation that will inhibit regeneration establishment. Valid inhibiting ground conditions are rock, water, and compacted soil, roads, etc. If the plot is a **non-stockable plot,** record "0" for this variable (to indicate a capable growing area percent of 0). Enter "100" for all other plots.

Note: this attribute is no longer required unless information on the site's ability to regenerate is needed.

4.4 Plot Aspect (3-digit) *Required*

Record the direction toward which the plot faces (to the nearest degree, 0° to 360°). PLOT ASPECT may be determined by taking compass readings directly down slope from the plot center.

Examples:

Aspect Code	Description
0	Flat
183	183°
360	360°
999	Indeterminate/No predominant aspect/Undulating

❖ **Tolerance** (Plot Aspect): ± 45 degrees

4.5 Plot Slope (3-digit) *Required*

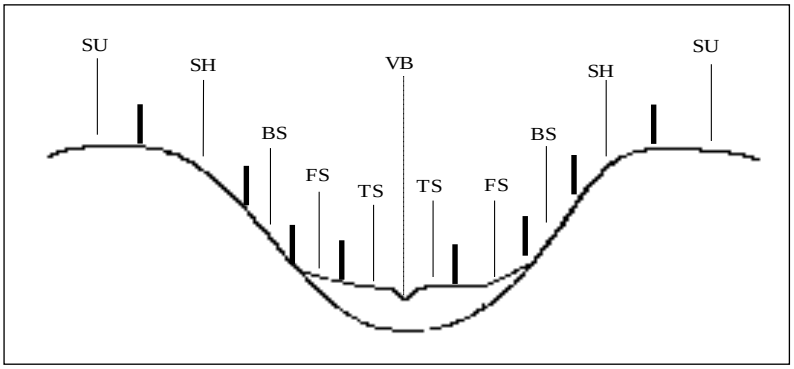
Record the average slope for the plot area (to the nearest 1 percent). Average the down slope and upslope measurements from plot center using a clinometer. Slope is defined as the ratio of vertical rise divided by the horizontal distance.

❖ **Tolerance** (Plot Slope): ± 10 percent

4.6 Plot Slope Position (2-character)

Record the position of the plot on the landscape as defined below. Slope position definitions from: *National Soil Survey Handbook (Title 430-VI). 1993. USDA Soil Conservation Service.*

Code	Description
SU	**Summit/Ridgetop/Plateau**. The topographically highest hillslope position of a hillslope profile and exhibiting a nearly level surface.
SH	**Shoulder**. The hillslope position that forms the uppermost inclined surface near the top of a hillslope. It comprises the transition zone from backslope to summit.
BS	**Backslope**. The hillslope position that forms the steepest inclined surface and principle element of many hillslopes. In profile, backslopes are commonly steep, linear, and bounded by a convex shoulder above and descending to concave footslope. They may or may not include cliff segments. Backslopes are commonly erosional forms produced by mass movement and running water.
FS	**Footslope**. The hillslope position that forms the inner, gently inclined surface at the base of a hillslope. In profile, footslopes are commonly concave. It is a transition zone between upslope sites of erosion and transport.
TS	**Toeslope**. The hillslope position that forms the gently inclined surface at the base of a hillslope. Toeslopes in profile are commonly gentle and linear, and are constructional surfaces forming the lower part of a hillslope continuum that grades to a valley bottom.
VB	**Valley Bottom**. Wide valley bottom beyond influence of toeslope.



❖ **Tolerance** (Plot Slope Position): ± 1 class

4.7 Slope Horizontal Shape (2-character)

Record the micro-site horizontal shape of the plot. The horizontal shape is oriented across the slope, going from **side-slope to side-slope**, perpendicular to the vertical shape (or roughly parallel to the contours of the landforms). Use a 1/10th-acre plot for ocular estimate. Refer to SLOPE VERTICAL SHAPE (Item 4.8) for valid codes.

4.8 Slope Vertical Shape (2-character)

Record the micro-site vertical shape of the plot. The vertical shape lies perpendicular to the contours, going from **up-slope to down-slope**, regardless of the slope percentage. Use a 1/10th-acre plot for ocular estimate. Valid codes and examples are listed below.

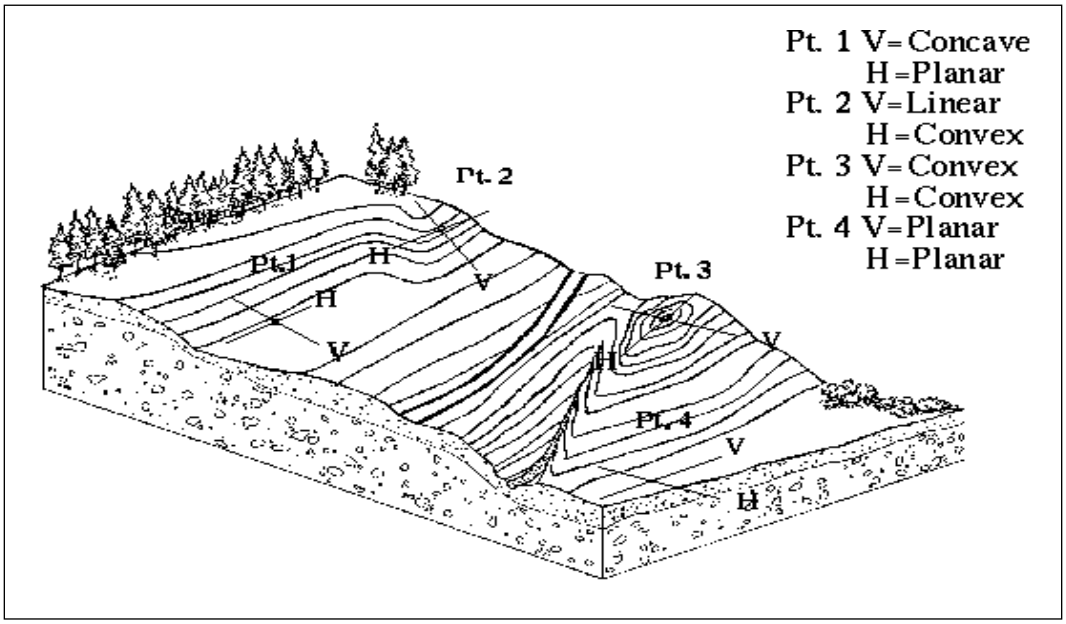
Note: The definitions below do not adequately describe **hilltops** and **depression bottoms**, because all directions at these sites are perpendicular to the contours and no direction is parallel (specific direction is irrelevant). Therefore, classify hilltops as convex, and depression bottoms as concave, for SLOPE HORIZONTAL SHAPE (Item 4.7) and SLOPE VERTICAL SHAPE.

SLOPE HORIZONTAL SHAPE (Item 4.7) and SLOPE VERTICAL SHAPE (Item 4.8):

Code	Description
BR	**Broken**. Cliffs, knobs, and/or benches interspersed with steeper slopes generally characterized by sharp, irregular breaks. A marked variation of topography, or an irregular and rough piece of ground.
CC	**Concave.** The gradient decreases down the slope. Runoff tends to decelerate as it moves down the slope, and if it is loaded with sediment the water tends to deposit the sediment on the lower parts of the slope. The soil on the lower part of the slope also tends to dispose of water less rapidly than the soil above it.

CV	**Convex**. The gradient increases down the slope and runoff tends to accelerate as it flows down the slope. Soil on the lower part of the slope tends to dispose of water by runoff more rapidly than the soil above it. The soil on the lower part of a convex slope is subject to greater erosion than that on the higher parts.
LL	**Linear or Planar.** Substantially a straight line when seen in profile at right angles to the contours. The gradient does not increase or decrease significantly with distance (level or little relief).
PA	**Patterned**. A general term for any ground surface exhibiting a discernibly ordered, more-or-less symmetrical, morphological pattern of ground (e.g., micro relief of hummock and swales of several feet).
UN	**Undulating**. One or more low relief ridges or knolls and draws within the plot area.
UA	Unable to Assess.

Examples:



4.9 Plot Elevation (5-digit)

Record the elevation of the plot center (to the nearest foot), preferably as determined from a GPS unit (in 3D mode with 180 fixes).

- **Tolerance** (Plot Elevation):
  - GPS: ± 100 feet

4.10 Plot Existing Vegetation Composition Type (8-character)

Record the code for the current (not potential) vegetative or non-vegetative type dominating the plot area. Dominance is based on plurality of basal area. Refer to R1 CSE/IM Field Guide Appendix E for a complete list of EXISTING VEGETATION COMPOSITION TYPE codes and reference options. This attribute is generally not

collected in R1 as dominance type algorithms are applied to all inventory data in FSVeg after the exam has been loaded. For more information on dominance type algorithms see the *R1 Existing Veg Classification System and its Relationship to Region 1 Inventory Data and Map Products* (Barber, et al., 2011).

4.11 Plot Potential Vegetation (8-character) *Required*

Record the code for the POTENTIAL VEGETATION (habitat type) to phase for the plot area. Potential vegetation is the community that develops over time, primarily influenced by soil and climate. It represents the area in a climax or near-climax condition. Refer to R1 CSE/IM Field Guide Appendix G for a complete list of POTENTIAL VEGETATION codes.

Refer to POTENTIAL VEGETATION REFERENCE (Item 2.18) for potential vegetation reference options. These references are used for the plot and setting level.

- **Tolerance** (Plot Potential Vegetation): Accurate to R1 Habitat Type Group. See Table 2 in *R1 Forested Potential Vegetation Group Crosswalk, Region 1 Existing and Potential Vegetation Groupings used for Broad-level Analysis and Monitoring* (Milburn et al. 2015) unless otherwise specified at the project level.

4.12 Plot Fuel Model (2-digit)

Record the fuel model that best describes the plot area. It is highly recommended that individuals collecting this data first obtain the appropriate training. Note: If FUEL MODEL data is the only fuel loading information collected (it is collected instead of Brown's Protocols), record "0" for EXAMINATION LEVEL (Item 2.13) on the Down-Woody Materials Form. Fuel models are found in the R1 CSE/IM Field Guide Appendix U.

Fuel Photo Series – An alternative classification method is a fuel photo series, developed for numerous areas across the country. These series display photos that may be similar to the plot and provide the information on what fuel model the photo represents. If this option is used, record the FUEL PHOTO REFERENCE (Item 2.33) on the Setting Form and the fuel photo number, the RESIDUAL DESCRIPTIVE CODE (Item 4.13), on the Plot Form.

Fuel loading classification guides:

- **Hal Anderson Report –** General Technical Report INT-122, ***Aids to Determining Fuel Models for Estimating Fire Behavior*** by Hal Anderson, presents photographs of 13 fuel models used in making fire behavior projections
- **Scott and Burgan –** General Technical Report – 153, ***Standard Fire Behavior Fuel Models: A Comprehensive Set for Use with Rothermel's Surface Fire Spread Model*** contains 40 fuel models. These models produce a generalized level of information regarding fuel properties.

4.13 Residual Descriptive Code (Fuel Photo Series) (15-character)

If a Fuel Photo Series (refer to Item 2.22) is used to determine fuel loadings for the plot area, record the fuel photo number (referred to as stand number in documentation) of the corresponding photo selected on the plot data form. Refer to the R1 CSE/IM Field Guide Appendix I for a complete list of Fuel Photo references and codes.

Note:

- Also, record the corresponding FUEL PHOTO REFERENCE code on the Setting Form; Setting Item 2.33.
- If Fuel Photo Series is the only down-woody material fuel loading information collected (e.g., it is collected instead of Brown's Protocols), record "0" for EXAMINATION LEVEL (Setting Item 2.13) on the Down-Woody Materials Form and select the Residual Description Code under Setup<Field Selections for the Plot Form (see Section 12) so this attribute is enabled on the Plot Form.

4.14 Distance to Seed Wall (3-digit)

Record the distance, in feet, from the plot center to the boundary of an adjoining setting where there are seed-producing trees, or a seed wall. Typically, this value is recorded where most of the overstory has been removed or destroyed within the last 20 years.

❖ **Tolerance** (Distance to Seed Wall): ± 100 feet

4.15 Plot User Code (4-character)

Check with your Forest for specific instructions on using this field. The data entered in this field are not managed at a National level and are stored in a generically labeled field.

If you are collecting Tree Canopy Cover using line intercept protocols and are not collecting other Vegetation Composition information (i.e. Examination Level of Vegetation Composition on the Setting Form (Item 2.13) is 0, then enter the Tree Canopy Cover measurement here. See R1 CSE/IM Field Guide Supplemental Appendix E for the R1 line-intercept Tree Canopy Cover protocol.

Enter CXX or CXXX in the plot user field where C denotes canopy and XXX is a two or three digit number indicating the canopy percent. For Example, C76 equals 76 percent canopy cover.

Example of Data Entry for Canopy Cover in Plot User Field

Plot Data for Setting: 01120100010131_04/04/2017

Plot #	Latitude	Longitude	ASP	*Slp%	*PotVeg	UseF
1			120	33	010	C76

If collecting Lynx Horizontal Cover according to R1 CSE/IM Field Guide Supplemental Appendix I, enter LXX or LXXX in the plot user field where L denotes lynx horizontal cover and XXX is a two or three digit number indicating the canopy percent. For

Example, L76 equals 76 percent canopy cover. See R1 CSE/IM Field Guide Supplemental Appendix I for the R1 Horizontal Cover Estimate protocols.

4.16 Plot History (4-digit)

Record the code corresponding to any activities or disturbances that occurred on the plot, or affected the plot. Multiple codes may be entered. For each additional event, record the PLOT NUMBER (Item 4.1), PLOT HISTORY code, and PLOT HISTORY DATE (Item 4.17) on the next consecutive line.

Code	Description
1	Site Preparation
2	Artificial Regeneration
3	Natural Regeneration
4	Stand Improvement
5	Tree cutting
6	Fire
7	Other Silvicultural Treatments
8	Other Human Disturbance
9	Natural Disturbance
10	Land Clearing
11	Insect/Disease outbreak
12	Animal Damage
13	Type Conversion
14	Mining
15	Clear cut
16	Heavy partial cut (≥ 20% removed)
17	Light partial cut (< 20% removed)
18	Firewood or local use cut
19	Incidental cut
20	Pre-commercial thin
21	Improvement cut
22	Planting throughout the stand
23	Planting within non-stocked holes in the stand
24	Under-planting
25	Clean and release
26	Chaining

4.17 Plot History Date (4-digit)

If PLOT HISTORY (Item 4.16) is recorded for the plot, record the year (using a 4-digit code) that the activity or disturbance occurred. Determine/estimate year based on field observations, or based on information obtained from the Forest.

4.18 Plot Narrative/ Remarks (242-character)

Enter remarks relevant to the plot.

4.19 Plot Photos

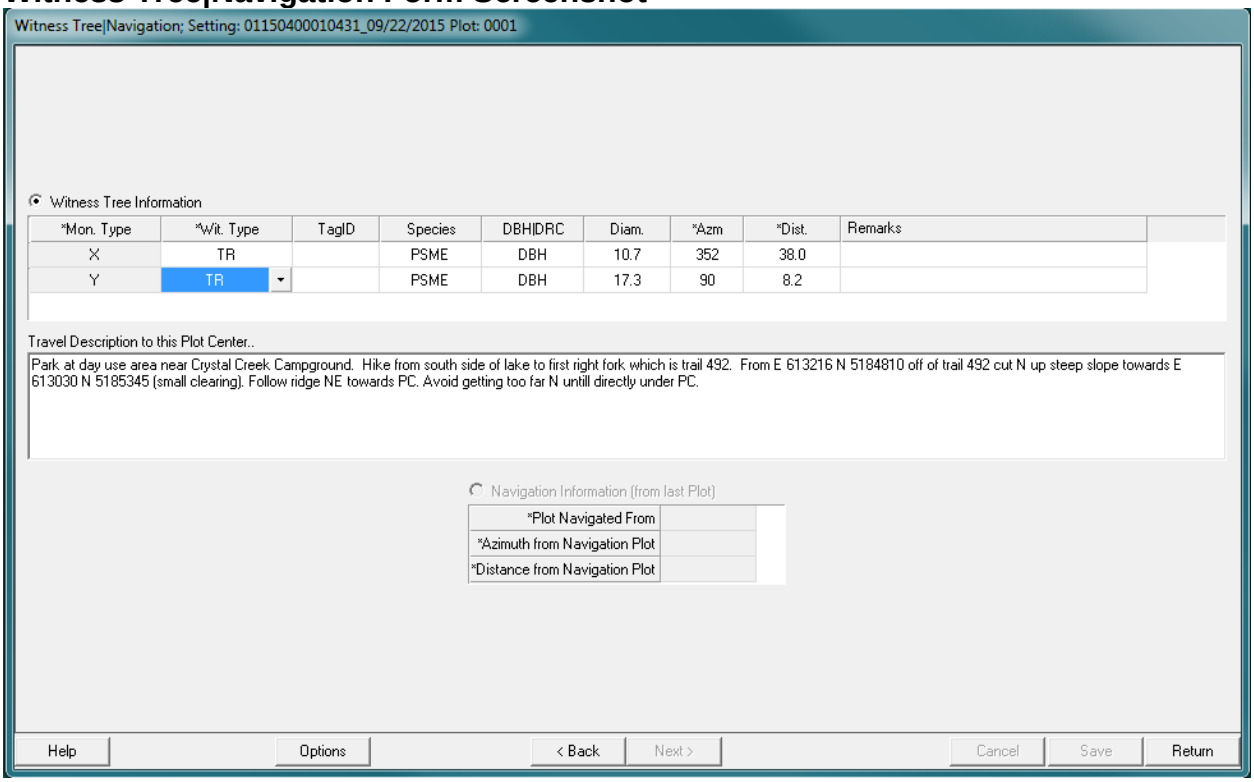
If plot photos will be taken, see the R1 CSE / IM Field Guide Supplemental Appendix R1-F for detailed information on taking, naming and loading photos into FSVeg.

- **Tolerance** (Plot Photos): No Errors

4.20 Witness Tree/Navigation Information (IM)

This form is only available when using the "blue" Inventory and Monitoring (.im) option in Exams, not in the "red" .cse option. The Witness Tree/Navigation Information form is used to enter data that will help crews relocate the plot center when remeasuring a plot. By default, the Witness Tree Information radio button is selected and the fields in this section are enabled. If Navigation Information (from last Plot) fields are needed, select the Navigation Information (from last Plot) radio button to turn them on. Data can only be entered into one of these sections at a time. Exams will not allow data entry in both of these sections, so all data must be deleted out of the Witness Tree Information section in order to select the Navigation Information (from last Plot) radio button to enter data into these fields. The following screen shot shows data entered into the Witness Tree Information section. For detailed information on how to monument plot center for IM plots that will be remeasured over time, see R1 Supplemental Appendix R1-G Plot Establishment (IM).

Witness Tree|Navigation Form Screenshot



4.20.1 X/Y Monument Type (IM) (1-character)

There are only two valid values for this field: X or Y. When using the Witness Tree Information section of this form, you MUST enter one record in this column with an X and the other with a Y.

- **Tolerance** (X/Y): No Errors

4.20.2 X/Y Witness Type (IM) (2-character)

Describe the item that is used to monument the plot. The drop down list contains the only valid values for this field. Trees are preferred as witness items when available.

- **Tolerance** (Measurement Number): No Errors

Witness Types

Witness Type Code	Witness Item
BO	Boulder
CA	Cairn
FI	Fence Intersection
OT	Other
RB	Road Bend
RI	Road Intersection
TR	Tree (preferred)

4.20.3 X/Y Tag ID (IM) (4-number)
This field is only activated when TR is selected in the WITNESS TYPE field. If the witness tree is a tally tree, the tree number is entered into this field.

- **Tolerance (X/Y Tag ID):** No Errors

4.20.4 X/Y Species (IM) (4-character)
This field is only activated when TR is selected in the WITNESS TYPE field. Enter the tree species (PLANTS code) when using a tree as a witness item.

- **Tolerance** (X/Y Species): No Errors

4.20.5 X/Y DBH/DRC (IM) (3-character)
This attribute is only available when Witness Type Code is TR. Indicate DBH or DRC, depending on species of tree. Note, if you enter a tally tree Tag ID, and the data has been entered on the Tree Form, this item will auto fill in Exams software.

- **Tolerance** (X/Y DBH/DRC): No Errors

4.20.6 X/Y Diameter (IM) (4-number)
This attribute is only available when Witness Type Code is TR. Enter the diameter of the tree.
Note: if you enter a tally tree Tag ID, and the data has been entered on the Tree Form, this item will auto fill in Exams software.

- **Tolerance** (X/Y Diameter): ± 0.2 inch per 20 inches of diameter

4.20.7 X/Y Azimuth (IM) (3-number)
Azimuth from plot center to the **center** of the bole of the witness tree or other witness object in degrees. Valid values are between 0 and 360.

- **Tolerance** (X/Y Azimuth): ± 10 degrees

4.20.8 X/Y Distance (IM) (4-number)
This field contains the **slope** distance *from* plot center to the center of the *face* of the witness tree or object. Record to the nearest 1/10th foot. *Note: Auto fill from tally tree Tag ID will populate horizontal distance.

- **Tolerance** (X/Y Distance): ± 0.2 feet

4.20.9 X/Y Remarks (IM) (30-character)
This field is for comments about witness items when needed. Remarks are especially important when trees are not the witness items. Record remarks to aid in plot relocation like detailed descriptions of the witness items.

- **Tolerance** (X/Y Remarks): No Errors

4.20.10 Travel Description to this Plot Center (IM) (30-character)
Enter a complete description of how to get to the plot center from a known location that will remain onsite for at least 10 years. Include driving and hiking directions with mileages, road names, parking location, trail names, landmarks and cardinal directions.

- **Tolerance** (Travel Description to this Plot Center): No Errors

4.21 Navigation Information (from Last Plot) Option (IM) (8-character)
When this option is selected by clicking the radio button, all of the following fields are required.

4.21.1 Plot Navigated From (IM) (4-number)
This drop-down menu will populate with a list of all the plots entered into the PDR except the one that is currently open. Choose the plot that is the starting point for these directions.

- **Tolerance** (Plot Navigated From): No Errors

4.21.1 Azimuth from Navigation Plot (IM) (3-number)
Enter the azimuth, in degrees, that was traveled from the prior plot to the current plot.

- **Tolerance** (Azimuth from Navigation Plot): No Errors

4.21.2 Distance from Navigation Plot (IM) (4-number)
Enter the distance in feet between the current plot and the starting point plot.

- **Tolerance** (Distance from Navigation Plot): No Errors

Section 5: Tree Data Form – Intensive Exam Level

The required fields and tolerances listed in this section are for the **Intensive** examination level. Item 1.3, Required Fields for the Tree Data Form by Exam Level, provides a table of minimum data requirements for an Intensive Exam Level on the Tree Data Form, for reference. Attributes that don't have a tolerance specified in this section should be defined at the project level, in the protocol or contract, based on project specifications. Additional attributes may be collected as needed to meet the information needs of the exam.

Exam Purpose (SE or CI): When taking any level of examination that includes the Tree Data Form, and the EXAM PURPOSE (Item 2.14) is code "SE" or "CI" (Stand Exam or Stratified Random Sample), the entire population of trees in the setting should be sampled.

5.1 Plot Number (3-digit) *Required*
Required only on paper forms. Record the PLOT NUMBER for each line of tree data. Plot numbers must be unique within a setting.

- **Tolerance** (Plot Number): No Errors

5.2 Tag ID Number (4-digit) *Required*
Required only on paper forms. Tag ID numbers will be autopopulated sequentially by Exams on a PDR. Record a unique TAG ID NUMBER for each sample tree, or tree group (if appropriate). Tag ID is the consecutive numbering of the tree data lines for each plot beginning with "01" from true North. The numbering sequence is repeated on each plot.

- **Tolerance** (Tag ID Number): No Errors

5.3 Tree Status (1-character) *Required*
Record a TREE STATUS code to identify each sample tree as live or dead.

Code	Tree Status	Description
L	Live	Trees that have at least one green point of growth. Includes deciduous trees that have lost their foliage for the season, and trees that have recently lost their leaves to defoliators but will re-flush.
D	Dead	Trees without a green point of growth. Note: Many of the Tree Data fields are not recorded for dead trees; a SNAG DECAY CLASS (Item 5.20) is required for Extensive and Intensive Exam levels.

❖ **Tolerance** (Tree Status): No Errors

5.4 Tree Class (2-character)

TREE CLASS codes are used to describe the condition of each sample tree in relation to its potential to satisfy silvicultural objectives. Tree class refers to the tree's ability to live, grow, and yield commercial products. Assign a TREE CLASS code to each sample tree individually without regards to other trees in the stand or plot area. A silvicultural treatment prescription is not implied by this tree class coding. Also, the assignment of TREE CLASS does not presume any particular stocking guidelines, cutting cycles, or rotation ages.

There are seven TREE CLASS codes: Codes **DE, AC, UA, RF,** and **RN** apply to live trees; codes **SV** and **US** apply to dead trees.

- **Live Trees –** a tree is considered "live" if it has, at the time of sampling, any amount of green foliage and normal root contact with the soil. In the case of deciduous trees, green foliage may be absent at the time of sampling; therefore, the condition of the meristematic tissue (Cambium or buds) should be substituted for the foliage criteria.

- **Dead trees –** a tree is considered "dead" if it does not have, at the time of sampling, any green foliage or healthy meristematic tissue. Classify a tree as dead if it has recently been uprooted or severed from its roots.

TREE CLASS is partly predicated on whether the tree currently or potentially contains a merchantable sawlog. Standards for **sawlog merchantability** are as follows:

Sawlogs in Live Trees:

Species	Min DBH	Min Piece Size	Min Top DIB	% Sound [(a)]
Lodgepole pine	6.0 inches	8 feet	4.6 inches	25
All other species	7.0 inches	8 feet	4.6 inches	25

Sawlogs in Dead Trees:

Species	Min DBH	Min Piece Size	Min Top DIB	% Sound [(b)]
Lodgepole pine	8.0 inches	16 feet	7.0 inches	33 ⅓
White Pine	8.0 inches	8 feet	7.0 inches	33 ⅓
All other species	8.0 inches	8 feet	5.6 inches	33 ⅓

[(a)] Percent Sound, Live Trees – based on Scribner board-foot scale of the minimum piece after all Scribner scaling defects have been deducted.

[b] Percent Sound, Dead Trees – consider all Scribner scaling defects; disregard weather checks (except for open, prominent seasoning, or weathering splits/checks).

TREE CLASS codes:
Commercial Species include: ABGR, ABLA, LALY, LAOC, PIAL, PICO, PIFL2, PIMO3, PIPO, PSME, THPL, TSHE, TSME

Code	Tree Class	Live	**Must have the following characteristics:**
DE	Desirable	Y	**Desirable Crop trees** are commercial species that have all of the following characteristics: • no defects that will reduce merchantable sawlog yields. • no damaging agent(s) that affects growth or survival. • relatively vigorous for its age as evidenced by past growth rate or crown condition.
AC	Acceptable	Y	**Acceptable Crop trees** are commercial species that have one or more of the following characteristics: • some minor defects that will reduce, but not totally exclude, merchantable sawlog yields. • if damaging agent(s) present, only in minor amounts; agent(s) will not affect the survival of the tree for at least the next 10 years. • relatively nonvigorous for its age as evidenced by slow past growth or poor crown condition, but still retains the potential to grow and accumulate net merchantable volume.
UA	Un-acceptable	Y	**Un-acceptable trees** are non-cull commercial species that have one or more of the following characteristics (*not intended to reflect trees excess to management needs*): • a severe rating for any damaging agent, but does, or will, meet minimum sawlog merchantability standards. • expected to die within the next 10 years. • not accumulating net volume growth; it is deteriorating more rapidly than it is growing. • not expected to accumulate net merchantable volume, even if relieved of competition.

Code	Tree Class	Live	**Must have the following characteristics:**
RF	Rough	Y	**Rough trees** are cull for sawlogs due to one or more of the following characteristics: • currently a non-commercial species for sawlog yields (even if the species may be merchantable for other products). • presently does not contain a merchantable live sawlog, and the principle defects are due to physical defects (this includes trees culled because of multiple forks). • currently too small to meet minimum size requirements for sawlog merchantability, and is not expected to yield any sawlog products because of severe damage other than rot.
RN	Rotten	Y	**Rotten trees** are cull for sawlogs due to one or more of the following characteristics: • presently does not contain a merchantable live sawlog and the principle defect is rot (DAMAGE AGENT CATEGORY 22). • currently too small to meet minimum size requirements for sawlog merchantability, and is not expected to yield any sawlog products because of severe damage due to rot.
SV	Salvable dead	N	**Salvable Dead trees** – dead trees that contain at least one merchantable dead sawlog.
US	Non-salvable dead	N	**Non-salvable Dead trees** – dead trees that do not contain at least one merchantable dead sawlog.

❖ **Tolerance** (Tree Class):

Tree Class Code	Acceptable Tolerance
DE	DE, AC
AC	DE, AC, UA
UA	AC, UA, RF*
RF	RF, UA*
RN	RN, UA*
SV	SV, US
US	SV, US

*Acceptable code providing damage/severity is consistent with the TREE CLASS definition.

5.5 Growth Sample Trees (1-character) *Required for GST*

Growth Sample Trees (GST) provide a means to select trees in an unbiased manner for additional, more time consuming data collection. In general, height, age, and radial or height growth are collected for GST trees. GST trees are identified by the Growth Sample Tree Field containing a 'G'. Leave this field blank for all other trees.

Refer to the GST selection guidelines, below, for information on selecting GST trees.

Code	Description
G	Growth Sample Tree

Note: Region 1 does not select site trees to provide information on site productivity so code S is not used.

Note: The "Check GST Tally" option can be turned on in the Tree Selection Form in Setup/Field Selection so that GST trees are identified by Exams software during data collection in the field**.** Refer to Section 12.3.4.2, *Exams Software Use,* for information on how to modify the GST selection criteria.

GST Tree Selection Guidelines:

1. On each plot, moving clockwise from azimuth 001 to 360 degrees, designate the first live, standing sample tree of each species in each of the following size classes as a GST:

DBH range	Height Class Range
<3.0 inches [(a)]	1 – 4 feet
	5 – 12 feet
	≥ 13 feet
3.0 – 4.9 inches	
5.0 – 8.9 inches	
9.0 – 14.9 inches	
First tree ≥ 15.0 inches [(b)]	
Largest tree ≥ 15.0 inches [(b)]	

[(a)] **Trees < 3.0-inches DBH –** to qualify as a GST, trees < 3.0-inches DBH must have a live, intact terminal leader (the most recent complete height increment); if the first tree < 3.0-inches DBH does not meet this criteria, designate the next qualifying tree on the plot < 3.0-inches DBH as the GST.

[(b)] **Trees ≥ 15.0-inches DBH –** if the first tree of a species ≥ 15.0-inches DBH is not the largest of that species on a plot (e.g., the first tree is 15.4 inches

DBH, and the largest tree of the same species is 21.2 inches DBH), designate both trees as GST trees.

5.6 Tree Species (8-character) *Required*

Record the TREE SPECIES code for each sample tree. See the R1 CSE/IM Field Guide Appendix H for common tree species codes found in Region 1.

Examples:

Code	Species Type
ABGR	Grand fir (Abies grandis)
PIPO	Ponderosa pine (*Pinus ponderosa*)

Temporary Species Codes: If the species for a tree cannot be determined at the time of the field visit, measure the tree, and temporarily use one of two generic TREE SPECIES codes: **2TE (evergreen)**, or **2TD (deciduous)**. Make a note to update the species code in FSVeg once the data is loaded, unless you are able to identify the tree before it is loaded into FSVeg and you can edit the species code in ExamsPC. Collect branch samples, foliage, cones, flowers, bark, etc., to bring to a local botanist for identification.

Tolerance (Tree Species): No Errors

5.7 Tree Count (3-digit) *Required*

Record the number of trees represented by each line of tree data.

For trees ≥ 3.0-inches DBH:

- Intensive and Extensive Exams – record all trees individually.

For trees ≤ 3.0-inches DBH (all exams):

- Group trees by species and height class (see below).
- Use a single data line for each sample tree group; record the actual number of trees within the group for TREE COUNT.
- For all other fields recorded for the sample tree group, such as DBH (Item 5.9), HEIGHT (Item 5.10), CROWN RATIO (Item 5.16), etc., record the average for the group.

Height Class Range (for sample tree groups)
<0.5 feet
1.0 - 4.0 feet
5.0 - 12.0 feet
13.0 - 19.0 feet
20.0+ feet

Note (Grouping Criteria): Grouping by "species and height class" has been standardized to facilitate stand exam contract inspection and payment. However, some exam objectives may necessitate tree grouping by other characteristics. Such characteristics include TREE CLASS, TREE AGE, CROWN RATIO, CROWN CLASS, and/or TREE DAMAGE.

Missed/Extra Tree Tolerance:

Number of Trees on Plot	Diameter (DBH)	Height or Height Class	Missed/Extra Tree Tolerance
0	NA	NA	No Errors
1 – 5		≤ 0.5 feet	± 2 trees
6+		≤ 0.5 feet	± 50%
1 - 5	< 0.5 inches	> 0.5 feet	± 1 tree
6+	< 0.5 inches	> 0.5 feet	± 20%
1 - 5	0.5 in - Breakpoint DBH	All	± 1 tree
6+	0.5 in - Breakpoint DBH	All	± 10%
1+	Breakpoint DBH +	All	No Errors

- **Tolerance** (Missed/Extra Trees): No Errors

5.8 Number of Stems (3-digit)
Indicate the number of stems used to calculate a DRC for woodland species

5.9 DBH/DRC (3,1-digit; xxx.y) *Required*
Record the **Diameter at Breast Height (DBH)** for each sample tree (and off-plot site trees). For tree groups, select the mean (average) tree within the group, and record DBH for that tree. **Do not record values for trees less than 4.5 feet tall**. Measure DBH to the nearest tenth inch (always round down).

Examples:

Code	Tree Diameter
Blank	Germinates: seedlings < 4.5 feet tall
0.3	0.3 inch-diameter
18.7	18.76 inch-diameter

5.9.1 Diameter Measurement: DBH

DBH is the outside bark diameter measured at 4.5 feet above the forest floor on the uphill side of the tree. The forest floor includes the duff layer that may be present, but

does not include unincorporated woody debris that may rise above the ground line. If a dead tree (snag) is missing bark, measure the DBH without the bark and record that measurement. Do not attempt to estimate the bark thickness into the DBH measurement.

- **Trees with bole irregularities –** Some trees have substantial bole irregularities at breast height such as branches, swellings, or depressions. In such cases, take the diameter measurement as close as possible to breast height, but above or below the deformity. If this is not possible, because of the vertical extent of the irregularity, then adjust the DBH measurement to better reflect the diameter of a regular bole. Note: If DBH is measured at a place other than 4.5 feet, or DBH is estimated to better reflect the tree bole, record a note in the TREE REMARKS (Item 5.26).

- **Trees with forks –** For trees that fork below breast height, sample each fork as a separate tree. Record the DBH for each fork at 4.5 feet above the forest floor.

Refer to the R1 CSE/IM Field Guide Appendix L and the R1 CSE/IM Field Guide Appendix M for instructions on measuring DBH and examples of measuring trees with bole irregularities.

(IM) – When remeasuring a tree DBH, the tolerance for the location of the DBH measurement changes because of the importance of being able to compare the diameter measurements.

❖ **Tolerance** (Height above ground that DBH is measured):

Measurement Type	Tolerance
CSE or IM Installation	± 0.2 inch from 4.5 feet
IM Remeasurement	± 12 inches from 4.5 feet

❖ **Tolerance** (DBH):

DBH (range)	Tolerance
< 0.5 inch	No Errors
0.5 - 13.9 inches	± 0.1 inch
14.0 - 23.9 inches	± 0.2 inch
24.0 - 34.9 inches	± 0.3 inch
35.0+ inches	± 0.5 inch
Borderline variable-plot trees	± 0.1 inch (to determine trees in or out)

5.9.2 Diameter Measurement: DRC

Diameter at Root Collar (DRC) is the diameter measured at the root collar or at the natural ground line, whichever is higher, outside the bark. Measure tree stems only, not branches. A stem generally grows in an upright position and contributes to the main structural support of a tree crown. If the diameter is measured at root collar, the number of stems is required.

- **DRC is only measured on three tree species in Region One:** Rocky Mountain Juniper, Utah Juniper, and Curl-Leaf Mountain Mahogany

- DRC measured trees commonly have multiple stems. DRC-measured trees with stems clumped together and a unified crown and appearing to be from the same origin are treated as one tree. If necessary for diameter measurement, remove loose material on the ground but not mineral soil. For multi-stemmed DRC-measured trees with at least one stem ≥ 5.0 " at the root collar, DRC is computed as the square root of the sum of the squared stem diameters. For a single-stemmed tree, DRC is equal to the single diameter measured. For a multi-stemmed tree, DRC is calculated from the diameter measurements of all qualifying stems (≥ 1.5" diameter and at least one foot in length).

- Use the following formula to compute DRC. Record individual stem diameters in the tree form "REMARKS" column for inspection purposes.

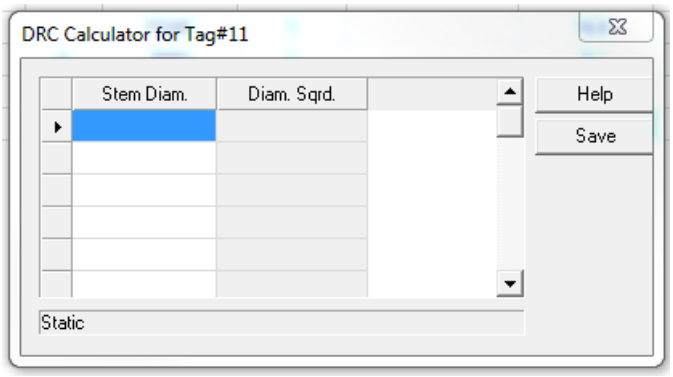
$$\text{DRC} = \sqrt[n]{\sum_{1}^{n} (\text{stem diameter})^2}$$

Example: Tree #1 has three qualifying stems; 5.9, 2.4, and 1.5

$$\text{DRC} = \sqrt{(5.9)^2 + (2.4)^2 + (1.5)^2} = 6.5$$

When DRC is impossible or extremely difficult to measure with a diameter tape (e.g., due to thorns, extreme limbs, packrat's nest), the stem(s) may be estimated to the nearest inch. Note "estimated DRC" in the tree form "REMARKS" column.

You can use Exams to calculate the DRC of a multi-stemmed tree, however you will still need to enter the individual diameters into the Tree Remarks. With the DBH|DRC field highlighted, click the options button and choose DRC Calculator. This will open the DRC Calculator window.



Enter the diameter of each qualifying stem in the first column. Once all of the diameters have been entered, click Save and the calculated DRC will be populated in the #DBH|DRC field.

Refer to R1 CSE/IM Field Guide Appendix L and R1 CSE/IM Field Guide Appendix M for instructions on measuring DRC and examples of measuring trees with bole irregularities.

- **Tolerance** (DRC):

DRC (range)	Tolerance
< 0.5 inch	No Errors
0.5 - 13.9 inches	± 0.1 inch
14.0 - 23.9 inches	± 0.2 inch
24.0 - 34.9 inches	± 0.3 inch
35.0+ inches	± 0.5 inch
Borderline variable-plot trees	± 0.1 inch (to determine trees in or out)

5.10 Height (3-digit):
Required for GST trees, all trees < 4.5 feet tall, and trees with broken or missing tops
Record HEIGHT (total standing tree height, to the nearest 1.0 foot) from the ground line on the uphill side of the tree, to the uppermost tip, for the following types of trees:

- Growth Sample Trees (GST)
- **All trees with broken or missing tops –** Record standing height from the ground line to the break, and record a TREE DAMAGE CATEGORY of "broken or missing top" (damage code 99-001; see Item 5.22).
- **All trees less than 4.5 feet tall –** For trees < ½-foot tall (0.5 feet), record HEIGHT to the nearest 1/10th foot (0.1 foot). For trees ≥ 0.5 feet tall, record HEIGHT to the nearest 1.0 foot.

Note: Record additional tree heights for the following cases: (1) when two adjacent sample trees of similar height can be viewed from the same vantage point, and (2) when the height/diameter relationship of a particular tree seems atypical with respect to other trees of the same species.

Refer to R1 CSE/IM Field Guide Appendix P for details on measuring tree heights.

- **Tolerance** (Height): ± 10 percent of actual standing tree height

5.11 Height to Crown (3-digit)

Record crown height (to the nearest 1.0 foot) on the uphill side of the tree, from the ground line to the base of the live crown (the lowest branch whorl with live branches in at least two quadrants, exclusive of epicormic branches and whorls not continuous with the main crown).

See R1 CSE/IM Field Guide Appendix Q for examples of determining HEIGHT TO CROWN.

- **Tolerance** (Height to Crown): ± 10 percent of actual crown height

5.12 Radial Growth (2-digit) *Required for GST trees*

Record RADIAL GROWTH (10-year increment) for all Growth Sample Trees with a diameter ≥ 3.0 inches. Measure the last 10 years of radial growth from an increment core taken directly below the point of diameter measurement, at a right angle to the bole. To reduce bias, bore on the side of the tree facing plot center (when possible). Using a ruler with a 1/20th-inch scale, measure the width of the outer complete 10 annual increments (most recent). Record RADIAL GROWTH to the nearest 1/20th of an inch, using integers only (e.g., record 16/20th as '16,' and 6/20th as '06').

Refer to R1 CSE/IM Field Guide Appendix N for additional guidelines on measuring radial growth.

- **Tolerance** (Radial Growth): ± 1/20th inch

5.13 Radial Growth # 2 (2-digit)

This field is not used in Region 1.

5.14 Height Growth (2,1-digit) *Required for GST trees < 3.0 inches in dia.*

Record HEIGHT GROWTH (5-year) for all for Growth Sample Trees that are < 3.0 inches in diameter and ≥ 5 years old. It is important that height growth is measured for all height classes including >13 ft height class; therefore, make sure you have appropriate equipment (ht pole, binoculars, carpenters tape, laser, etc.) to take this measurement on taller trees. Measure the most recent five complete height segments (to the nearest 0.1 foot). Record HEIGHT GROWTH in feet and tenths of feet (e.g., record a 5-year height growth of 2.8 feet as '02.8'). Note: In order for a tree to qualify as a GST, the most recent, complete height increment must be alive and intact.

Refer to R1 CSE/IM Field Guide Appendix N for additional guidelines on measuring HEIGHT GROWTH.

- **Tolerance** (Height Growth):
  - For trees with a height ≥ 6 feet: ± 1 foot
  - For trees with a height < 6 feet: ± 0.1 foot

5.15 Tree Age (4-digit) Required for GST

Determine TREE AGE (record in years) for Growth Sample Trees, as specified below. **Note:** Additional age measurements may be required for other live sample trees if specified by the prescribing silviculturist; if additional age criteria are required, it should be applied consistently on every plot.

5.15.1 Breast Height Age

- **Trees with a diameter ≥ 3.0 inches –** Determine TREE AGE from an increment bore taken directly below the point of diameter measurement (DBH) and at a right angle to the bole. To reduce bias, bore on the side of the tree facing plot center (when possible). Count annual rings to the pith of the tree.

5.15.2 Total Age

- **Trees with a diameter < 3.0 inches –** Determine total age by counting branch whorls that represent annual height increments, or by severing the tree at the root collar and counting annual rings on the stump, or by taking an increment boring at the root collar. The most efficient and accurate method to use depends largely on the species and size of the sample tree.

5.15.3 Estimating TREE AGE

- If TREE AGE cannot be determined for a Growth Sample Tree, estimate age using the method outlined in R1 CSE/IM Field Guide Appendix O. If TREE AGE is estimated, record AE1 in the TREE REMARKS field (Item 5.26). Estimating age should only be used for rotten or hollow trees, or trees that are so large that the center cannot be reached. Age estimates are not acceptable due to improper maintenance of increment borers. If TREE AGE cannot be determined for a Growth Sample Tree, due to extensive heartrot, designate another tree as the Site Tree.

Refer to R1 CSE/IM Field Guide Appendix O for additional details on determining TREE AGE.

- **Tolerance** (Tree Age): based on annual ring count at breast height for trees ≥ 3.0 inches in diameter; based on total age for trees < 3.0 inches in diameter:
  - For trees < 300 years old: ± 10 percent
  - For trees ≥ 300 years old: ± 15 percent

5.16 Crown Ratio (3-digit) *Required*

Record CROWN RATIO (to the nearest percent) as the length of the live crown divided by tree height. Live crown length is assessed from the uppermost live leader or branch to the lowest live branch. Visually adjust large openings in the crown or lopsided crowns by transferring lower branches to fill in the holes. Do not excessively compress the live crown length because the crown appears "sparse" or contains "unhealthy" foliage.

Refer to R1 CSE/IM Field Guide Appendix Q for guidelines on measuring crowns.

- **Tolerance** (Crown Ratio): ± 10 percent

5.17 Crown Class (2-character) *Required*

Record CROWN CLASS for all live trees. CROWN CLASS is a categorization of a tree based on dominance in relation to adjacent trees in the stand (categories listed below). This dominance is indicated by crown development and amount of light received from above and the sides. Evaluate each tree in the context of its immediate environment (that is, how is the subject tree competing for sunlight or moisture with adjacent trees/shrubs).

- **Tolerance** (Crown Class): ± 1 class

CROWN CLASS Categories:

Code	Name	Description
OP	Open-grown or Isolated	Tree crowns receive full light from above and from all sides (throughout most of its life). In even-aged stands, these trees have their crowns well above the general canopy.
DO	Dominant	Tree crowns receive full light from above and partly from the sides. These trees are taller than the average trees in the stand and their crowns extend above the general level of the crown cover of others of the same stratum. Crowns are not physically restricted from above, although possibly somewhat crowded by other trees on the sides.
CO	Codominant	Tree crowns receive full light from above, but comparatively little from the sides. Crowns are at a general level of crown canopy, and are not physically restricted from above. Crowns are crowded by other trees from the sides. In stagnated stands, co-dominant trees have small-sized crowns and are crowded on the sides.
IN	Intermediate	Tree crowns occupy a definitely subordinate position and are subject to strong lateral competition from crowns of dominants and codominants. They receive little direct light from above through small holes in the canopy, but no light from the sides.

Code	Name	Description
OV	Overtopped	Tree crowns receive no direct light from above or from the sides and are entirely below the general level of dominant and codominant trees.
RE	Remnant	Trees that remain from a previous management activity or catastrophic event. The tree is significantly older than the surrounding vegetation. Remnant trees do not form a canopy layer and are usually isolated individuals or small clumps. *This definition is from the Region 6 Inventory and Monitoring System field procedures for the Current Vegetation Survey.*
AB	Leader Above Brush	The terminal leader of the tree is above the surrounding brush while the middle or lower crown may be within the brush canopy. Only use this code in regenerated stands and where overstory competition is absent.
IB	Leader Within Brush	The terminal leader and upper crown of the tree is within the brush canopy. Only use this code in regenerated stands and where overstory competition is absent.
UB	Leader Overtopped by Brush	The crown of the tree is completely overtopped by the surrounding brush. Brush cover crown classes only apply to isolated or dominant trees with brush competition (class codes are used as modifiers for open-grown or dominant trees). Competition from adjacent trees is more important than competition from shrubs if they both occur. Generally, brush cover crown codes are used in stands where overstory tree competition is absent.

5.18 Crown Width (3-digit)

Record CROWN WIDTH (in feet) as the average of two measurements:

1) The widest distance anywhere in the crown, between the outer ends of two live branches - the drip line (note: do not use abnormally long branches sticking out beyond the edge of the crown); and

2) The distance perpendicular to the widest measurement.

❖ **Tolerance** (Crown Width): ± 10 percent

5.19 Wildlife Use (2-character)

If a tree exhibits any of the following stem characteristics, record the appropriate WILDLIFE USE code. These features that may indicate the presence of wildlife activity.

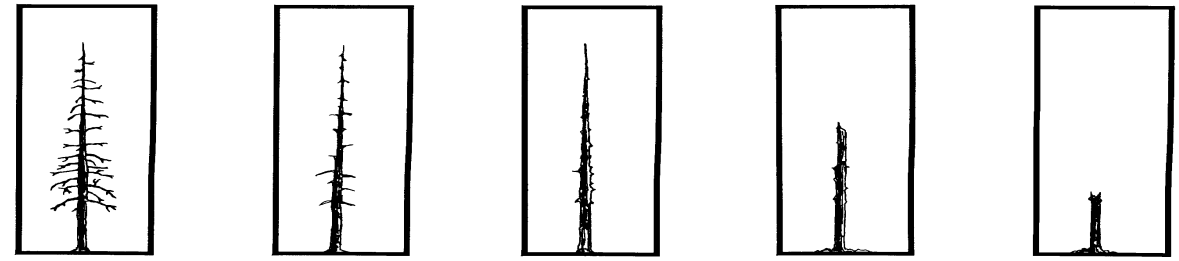
Code	Description
SC	Small cavities less than 3 inches in diameter
LC	Large cavities greater than 3 inches in diameter
LB	Loose bark
FH	Foraging holes/flaked bark: antler rubs, porcupine feeding
NE	Nest in tree and not in cavity

5.20 Snag Decay Class (1-digit) *Required for dead trees*

For standing dead trees (snags), record a SNAG DECAY CLASS code to indicate the condition of the tree. The pictures and descriptions below are adapted from: *Wildlife Habitats in Managed Forests of the Blue Mountains of Oregon and Washington (Agriculture Handbook No. 553). Jack Ward Thomas. September 1979. USDA Forest Service.*

SNAG DECAY Classes:

Code	Bark	Heartwood Decay	Sapwood Decay	Limbs	Top Breakage	Bole Form	Time Since Death
1	Tight, intact	Minor	None to incipient	Mostly Present	May be present	Intact	1-5 years
2	50% loose or missing	None to advanced	None to incipient	Small limbs missing	May be present	Intact	> 5 years
3	75% missing	Incipient to advanced	None to 25%	Few remain	Approx. ⅓	Mostly intact	> 5 years
4	75% missing	Incipient to advanced	25% +	Few remain	Approx. ⅓ to ½	Losing Form, soft	> 5 years
5	75%+ missing	Advanced to crumbly	50% + advanced	Absent	Approx. ½ +	Form mostly lost	> 5 years



Class 1 Dead / recent — Class 2 — Class 3 — Class 4 — Class 5

- **Tolerance** (Snag Decay Class): ± 1 class

5.22 Tree Damage Category (2-digit) *Required*

For live trees with damages, record a TREE DAMAGE CATEGORY code(s), based on physical evidence. For recently dead trees (those that have died within the last 5 years), record a TREE DAMAGE CATEGORY to indicate the cause of death. Multiple damage codes may be recorded for each tree (order of recording is arbitrary). If a TREE DAMAGE CATEGORY is recorded, also record TREE DAMAGE AGENT (Item 5.23) and TREE DAMAGE SEVERITY (Item 5.25).

Refer to R1 CSE/IM Field Guide Appendix R for a complete listing of TREE CATEGORY, AGENT, and SEVERITY codes that are valid in Region One. Codes are provided for general categories of damaging agents, as well as for specific agents. The general category code should be used if there is any question as to the identity of the specific damaging agent. *It is very important to record only accurate pest information in stand examinations.* See the CSE General Descriptions of Insects and Diseases for more specific identification information.

In order to facilitate Region-wide assessment of certain damaging agents, the following agents should always be recorded when observed ("category – agent" codes indicated below):

- Mountain pine beetle (11-006)
- Douglas-fir beetle (11-007)
- Spruce beetle (11-009)
- Western spruce budworm (12-040)
- Douglas-fir tussock moth (12-123)
- Dwarf mistletoe (23-008)
- White pine blister rust (26-001)
- Root diseases (agent 21 codes)
- Severe damage caused by livestock (42-001), big game (41-003), and pocket gophers (41-005)

5.23 Tree Damage Agent (3-digit) *Required*

Record if a TREE DAMAGE CATEGORY is recorded (see Item 5.22 above). Refer to R1 CSE/IM Field Guide Appendix R for a complete listing of TREE CATEGORY, AGENT, and SEVERITY codes.

5.24 Tree Damage Part (2-character)

Record only when required by the project at hand. If collecting this attribute, then a TREE DAMAGE CATEGORY must be recorded (see Item 5.22 above). Record a code to indicate the specific location of damage(s) on the tree.

Code	Description
UN	Unspecified
TO	Top
FO	Foliar (Crown)

LI	Limb
BO	Bole, other than Top or Base
BA	Base
RO	Roots
WT	Whole Tree
TT	Top Third of Crown
MT	Middle Third of Crown
BT	Bottom Third of Crown

5.25 Tree Damage Severity (2-digit) *Required*

Record if a TREE DAMAGE CATEGORY is recorded (see Item 5.22 above). Refer to R1 CSE/IM Field Guide Appendix R for a complete listing of TREE CATEGORY, AGENT, and SEVERITY codes.

Notes for Tree Damage items:

5.25.1 Physical Effects damage categories –

For some of the "Physical Effects" damage categories (indicated in R1 CSE/IM Field Guide Appendix R), it will be necessary to estimate and record the percent of damage for the TREE DAMAGE SEVERITY code. For example, if the damage is "Total board-foot volume loss" (TREE DAMAGE CATEGORY code 99-013) and the percent of damage is estimated to be 45 percent of the merchantable tree volume, record '45' for the TREE DAMAGE SEVERITY code. Likewise, if the damage is "Scorched bark" (TREE DAMAGE CATEGORY code 99-020) and the percent of damage is estimated to be 25 percent of the bole area, record '25' as the TREE DAMAGE SEVERITY code.

5.25.2 Board-foot and cubic-foot volume loss –

Reduction in board-foot and/or cubic-foot volume loss will only be deducted from reports if damage codes 99-013 (Total board-foot volume loss) and/or 99-014 (Total cubic-foot volume loss) are recorded. To obtain net volume values (which reflect total defect), both board-foot and cubic-foot volume loss must be recorded. If these columns are NULL, net volume and gross volume will be the same.

5.25.3 Database codes –

When viewing the TREE DAMAGE SEVERITY code in FSVeg, it will be preceded by the 2-digit TREE DAMAGE CATEGORY code. For example, a mistletoe severity of "3" will be displayed as 233 in the database ("23" for mistletoe damage, and "3" for severity). As an exception, the "Physical Effects" damages do not precede each SEVERITY code.

❖ **Tolerance** (Tree Damage):

Code	Category	Damage Tolerance	Severity Tolerance
11	Bark Beetles	No misses on live trees with a severity of ≥ 2	± 0

Code	Category	Damage Tolerance	Severity Tolerance
12	Defoliators	No misses on live trees with a severity of ≥ 3	± 1 code
13	Chewing Insects	No misses on live trees with a severity of 2	± 0
14	Sucking Insects	No misses on live trees with a severity of 2	± 0
15	Boring Insects	No misses on weevils (Pissodes) or shoot moths (Eucosma) on live trees	± 0
16	Seed/cone/flower/ fruit insects	No misses of shoot moths (Eucosma) on live trees	± 0
17	Gallmaker Insects	No misses on live trees with a severity of 2	± 0
18	Insect Predators	No misses on live trees with a severity of 2	± 0
19	General Disease	No misses on live trees with a severity of 2	± 0
20	Biotic Damage	No misses on live trees with a severity of 2	± 0
21	Root/Butt Diseases	No misses on live trees with a severity of ≥ 2	± 0
22	Stem Decays/ Cankers	No misses on live trees with a severity of ≥ 3	± 1 code
23	Parasitic - Mistletoe	No misses on live trees with a severity of ≥ 3	± 1 code
24	Decline Complexes/ Dieback/Wilts	No misses on live trees with a severity of 2	± 0
25	Foliage Diseases	No misses on Elytroderma on live trees	± 0
26	Stem Rusts	No misses on live trees with a severity of ≥ 2	± 0
27	Broom Rusts	No misses on live trees with a severity of 2	± 0
30	Fire	No misses if damage affects > ¼ of the bole circumference, or if an open wound is in contact with the ground	± 0
41	Wild Animals	No misses on live trees with terminal leader damage or with greater than 1/4 of bole circumference affected	± 0
42	Domestic Animals	No misses on live trees with terminal leader damage, or with greater than 1/4 of bole circumference affected	± 0
60	Competition	No misses on live trees with a severity of 2	± 0
70, 71	Human Activity, Harvest	No misses on live trees for logging, human activity, or fire if the damage affects > ¼ of the bole circumference, or if an open wound is in contact with the ground	± 0
80	Multi-Damage (Insect/Disease)	No misses on live trees with a severity of 2	± 0

Code	Category	Damage Tolerance	Severity Tolerance
90	Unknown	No misses on live trees with a severity of 2 (≥ 20 percent)	± 10 percent
99	Physical Effects	No misses on live trees with a severity of ≥ 2 (≥ 20 percent)	± 10 percent

5.26 Tree Remarks (30-character)

Use this field to record any notes pertaining to a specific tree that may explain or describe another variable. Include notes regarding estimated/abnormal DBH measurements, heights of diameter measurements taken at locations other than 4.5 feet (breast height), and any other pertinent remarks.

- **Estimated Age –** if a tree is a Growth Sample Tree, and age needs to be estimated due to heartrot, record **'AE1**' in this field.
- **(IM Option only) Azimuth or Distance Change –** if a tree azimuth or distance needs to be changed because it is found to be out of tolerance upon remeasurement, indicate this by typing '**ACD**' in this field.

❖ **Tolerance** (Tree Damage): Recorded when applicable

5.27 Tree User Code (4-character)

The data entered in this field are not managed at a National level and are stored in a generically labeled field. Check with your Region and Forest for specific instructions on using this field.

5.28 Tree Treatment Option (1-character)

This field identifies a "Cut and Leave" treatment option. Valid codes are 1-9.
Note: This value is automatically assigned to the FVS tree input file as the prescription code (in column 49 of the input file).

5.29 Tree Distance (IM) (3-digit) ***Required for IM***

If using the IM option in Exams software, record the *horizontal distance* from the plot center to the center of the bole of the tree, at ground level, in 1/10 of feet. This field is required when collecting tree data that will be remeasured over time. This attribute is used to relocate trees from one measurement to the next and is used by the post load processor to pair trees with the previous measurement to determine age and radial growth.

❖ **Tolerance** (Tree Distance): Small Tree Plot: ± 0.2 ft
Large Tree Plot: ± 1.0 ft (if tree is located more than 1.0 ft from plot boundary)
Large Tree Plot: ± 0.2 ft (if tree is w/in 1 ft of plot boundary unless otherwise specified in field protocol)

If slope is > 10%, see R1 CSE/IM Field Guide **Appendix J: Fixed-Radius Plot** in this manual for information about converting slope distance to horizontal distance.

If the prior measurement's tree distance is found to be out of tolerance during remeasurement, correct the distance and indicate this by typing "ADC" in the TREE REMARKS field (5.29) to indicate an "azimuth or distance correction".

5.30 Tree Azimuth (IM) (3-digit) ***Required for IM***

If using the IM option in Exams software, record azimuth from the plot center to the center of the tree is at ground surface, to the nearest degree. This attribute is used to relocate trees from one measurement to the next and is used by the post load processor to pair trees with the previous measurement to determine age and radial growth.

- **Tolerance** (Tree Azimuth): ± 10 degrees

If the prior measurement's tree distance is found to be out of tolerance during remeasurement, correct the distance and type "ADC" in the TREE REMARKS field to indicate an "azimuth or distance correction".

Section 6: Vegetation Composition and Ground Surface Cover Forms – All Exam Levels

This section contains procedures for collecting vegetation composition and ground surface cover data. For Vegetation Composition, Cover by Lifeform protocols (Form 1) refer to Section 6.4, for Vegetation Composition Cover by Species protocols (Form 3) refer to Section 6.5, and for Ground Surface Cover protocols (Form 4) refer to Section 6.6.

Although there are other vegetation composition attributes available in the National Common Stand Exam protocols and an additional form (Form 2) the protocols listed in this section are those that are most commonly used in Region 1. If the purpose of the exam dictates further information is needed than what is currently defined in this section or you would like assistance with setting up a sampling strategy to ensure that information needs are met in regards to vegetation, please contact the R1 Analysis Team for assistance.

- **Vegetation Composition –** The optional vegetation composition protocols are used to collect estimates of cover by Lifeform (tree, shrub, forbs, and graminoids) and layers. It provides a sampling method to collect information on plant composition and structure to meet a variety of vegetation composition purposes.

- **Ground Surface Cover –** The optional ground surface cover protocols can be used to estimate the percent of ground cover for specified surface cover categories.

6.1 Setting Form Examination Level of Vegetation Composition

There are four different levels of intensity that may be used to collect vegetation composition data. Record the code to indicate the EXAM LEVEL used (listed below) in Exam Level of the Setting Form, Item 2.13. Record an EXAM LEVEL of “0” if vegetation composition data are not collected.

Exam Level of Vegetation Composition Form

Veg. Exam Level Code	Items to record	**Subpop. Min. ***	**Subpop Max.**	Cover by Lifeform (Form 1)	Cover by Species and Layer (Form 2)**	Cover by Species (Form 3)
0	Vegetation Composition is not collected, form is not used					
1	• Lifeform Cover % • Layer (tree/shrub)	Not applicable		Required	Not Applicable	Not Applicable

Veg. Exam Level Code	Items to record	**Subpop. Min. ***	**Subpop Max.**	Cover by Lifeform (Form 1)	Cover by Species and Layer (Form 2)**	Cover by Species (Form 3)
2	• Lifeform Cover % • Layer (tree/shrub) • Cover recorded for designated species (≥ min. %)	User defined	100	Required	• Optional, not generally used in R1 • "Designated" species that meet minimum cover criteria (subpop min)	"Designated" species that meet minimum cover criteria
3	• Lifeform Cover % • Layer (tree/shrub) • Cover recorded for all species (≥ min. %)	User defined	100	Required	• Optional, not generally used in R1 • All species that meet minimum cover criteria (subpop min)	All species that meet minimum cover criteria
4	• Lifeform Cover % • Layer (tree/shrub) • Cover recorded for all species (≥ min. %) • Designated Species	User defined	100	Required	• Optional, not generally used in R1 • All species that meet minimum cover criteria (subpop min) • Presence of all "designated" species	• All species that meet minimum cover criteria • Presence of all "designated" species

* Subpopulation minimum values are determined by the user based on information needs of the exam
** For Vegetation Composition Exam Level of 2, 3, or 4; Form 3 must be collected. Generally, in R1, Form 2, Cover by Species and Layer is not used.

6.1.1 Exam Level Descriptions:

- **Exam Level 1 (Lifeform/Layer):** Individual species are not recorded. Percent cover is recorded by Lifeform, and layers within the tree and shrub Lifeforms. Only Form 1 is required.

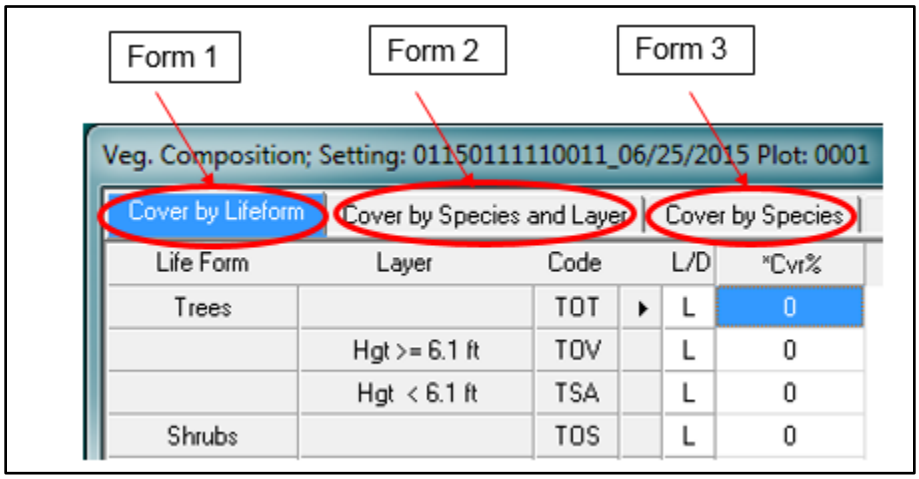
- **Exam Level 2 (Lifeform/Layer; *Designated* Species List):** Percent cover is recorded by Lifeform, and layers within the tree and shrub Lifeforms.

Furthermore, species on a "list" are recorded if they occur above the user specified minimum cover level. The sample design subpopulation minimum value is set to the minimum cover percent a species must occupy in order to be recorded. To record to trace level, set the subpopulation minimum to 0.1%. A reference to the list is placed in the Sample Design Form remarks column.

- **Exam Level 3 – (Lifeform/Layer; Species List):** Percent cover is recorded by Lifeform, and layers within the tree and shrub Lifeforms. Furthermore, all species are recorded if they occur above the user specified minimum cover level. The sample design subpopulation minimum value is set to the minimum cover percent a species must occupy in order to be recorded. To record to trace level, set the subpopulation minimum to 0.1%.

- **Exam Level 4 – (Lifeform/Layer; Species List; "Designated" Species):** Percent cover is recorded by Lifeform, and layers within the tree and shrub Lifeforms. Furthermore, all species are recorded if they occur above the user specified minimum cover level. **In addition, designated species on a "list" are recorded regardless of cover percent.** The sample design subpopulation minimum value is set to the minimum cover percent the species (not on the list) must occupy in order to be recorded. A reference to the list is placed in the Sample Design Form remarks column.

See the figure below of the three forms available for vegetation composition data in Exams. Form 1 is the Cover by Lifeform form, Form 2 is the Cover by Species and Layer form which is not generally used in R1, and Form 3 is the Cover by Species form.



6.2 Examination Level of the Ground Surface Cover Form

If ground surface cover data are collected (refer to Section 6.6), then record an Exam Level on the Setting Form (Item 2.13) of 1 to indicate that it is collected.

6.3 Information on the Vegetation Composition Plot

6.3.1 Sampling Methods

The following three sampling methods are supported when collecting vegetation composition and surface cover information. The information needs of the inventory will dictate which method is used. FSVeg sampling protocols allow different sampling methods to be used for each lifeform. See Section 3, Sample Design Form for specific information. Contact the R1 Analysis Team if you have specific questions about sampling methods.

Selection Method	Description	Population of interest for Selection Method listed	Discussion of sampling method
FRQ	Fixed area plots, either circular or rectangle	Foliar cover by lifeform or vegetation species,	Fast sampling method for sampling plant composition and structure May not be suitable for monitoring changes over time unless multiple quadrats within a plot are used. Contact R1 Inventory Coordinator to discuss further.
		Ground surface cover	Fast method for stand exams. Not appropriate for monitoring changes over time (IM)
TRN	Line-intercept method uses a transect of a fixed length and samples all items in the plane that extends perpendicular to the transect.	Canopy cover of trees	Most accurate method for measuring canopy cover of trees. If tree canopy cover is needed to be accurately measured, this method is recommended.
		Canopy cover of shrubs	Used primarily when remeasuring shrubs over time.
TPT	Point-intercept method uses a transect of fixed length and set of sample points at fixed distances along the transect.	Ground surface cover	Most accurate method for measuring surface cover. Recommend when monitoring changes over time (IM).
		Cover of grasses, forbs, and short shrubs	Recommend using when monitoring changes over time (IM).

6.3.1.1 Fixed Area

The fixed area method records the proportion of the plot that is covered by the attribute of interest. This is a quick method for assessing general amounts of vegetation and surface cover however, accurate estimates may be difficult to make on a plot that is large enough to represent general vegetation found in the stand.

Example Sample Design Form:

- **1/100th-acre fixed-plot –** measure ground surface cover types occurring within the plot perimeter (to trace amounts).

Tree | Veg. Composition | Ground Surface Cover | Down Woody Material (Brown's Survey)

Meth	ExpFac	Azm	Cond.	SubFiltr	Var	MinV	MaxV	Remarks
FRQ	100.0000		—		SVC	0.10	100.00	

Field Data Collection

Determine canopy cover (or surface cover), to the nearest percent, of the attribute of interest. Base all estimates on the cover of vegetation and plant parts that are (or were) alive during the current growing season, and are located within the specified plot perimeter.

Note: If slope is > 10%, see R1 CSE/IM Field Guide **Appendix J: Fixed-Radius Plot** in this manual for information about converting slope distance to horizontal distance.

6.3.1.2 Point-intercept

The point-intercept method uses a transect of fixed length and a set of sample points at fixed distances along it to tally surface or vegetation presence at each point. Percent cover is then calculated by dividing the number of points in each surface cover class or species or lifeform by the total number of points collected on the transect. This method is used on shrubs if they are not expected to extend more than 3 feet in height. This method should be used whenever accurate surface cover, or short (<3 feet) vegetation cover estimates are needed and as such is suitable for monitoring charges over time.

Example Sample Design Form:

- **100 foot point-intercept plot –** measure ground surface cover types occurring within the plot perimeter (to trace amounts).

Tree | Veg. Composition | Ground Surface Cover | Down Woody Material (Brown's Survey)

Meth	ExpFac	Azm	Cond.	SubFiltr	Var	MinV	MaxV	Remarks
TPT	100.0000		—		SVC	0.10	100.00	

Field Data Collection

Beginning at the 1-foot mark on the transect, place a tip of a plot stake or sharply pointed staff on the ground along the transect line at each 1-foot mark (against the right side of the tape with your back to plot center). At each point, record the

species or surface cover (depending upon lifeform of interest). For Ground Surface Cover, see Ground Surface Cover Transects Form (R1 supplemental form - R1 CSE/IM Field Guide Appendix R1-D) and record "hit" by the appropriate ground surface cover type category (Item 6.6.1). If more than one category occurs at a point (e.g., litter on top of a rock), always record the ground cover category that is on top (i.e., the category that the pointed staff touches first). Note: Foliar canopy cover above the soil surface plane is not considered to be ground surface cover.

Repeat procedure for each transects direction. Each of the four transect directions will contain 25 hits (for a total of 100 hits for the entire plot).

6.3.1.3 Line-intercept

Line-intercept sampling gives a more accurate and repeatable quantitative method for measuring canopy cover than ocular estimates. This method should be used whenever accurate tree canopy cover estimates are needed for monitoring changes over time

Example Sample Design Form:

- **Mixed sampling methods, based on lifeform–**
  - Line-intercept method to measure canopy cover of trees. Measured on 100' transect.
  - Fixed area plot method, 1/24th acre, measure all live shrub, grass, and forbs occurring within the plot perimeter.

Tree | Veg. Composition | Ground Surface Cover | Down Woody Material (Brown's Survey)

Meth	ExpFac	Azm	Cond.	SubFiltr	Var	MinV	MaxV	Remarks
TRN	100.0000		—	LIVE	TRE	0.01	100.00	
FRQ	24.0000		—	LIVE	SHR	0.01	100.00	
FRQ	24.0000		—	LIVE	FRB	0.01	100.00	
FRQ	24.0000		—	LIVE	GRM	0.01	100.00	

Field Data Collection

The line-intercept method uses a transect of fixed length along which the length of canopy of shrubs or trees that a plane extending vertically from the transect, are measured. Percent cover is then calculated by dividing the cumulative distance in each layer class or species or lifeform by the total length of the transect.

If the slope exceeds 10 percent, correct both the transect length and feet of canopy cover prior to entering a percent. See R1 CSE/IM Field Guide Appendix J for additional information on correcting for slope.

6.3.2 Plot Location

If tree data and/or down-woody materials are being sampled, use the same plot center or transects. However, if trampling of vegetation composition at plot center is a concern, consistently offset the plot center for all vegetation composition plots. If data other than

vegetation composition are being collected, the order in which the data are collected may be important. Vegetation composition and down-woody materials data may be more accurate if collected prior to collecting tree data (due to the effects of trampling).

6.3.3 Plot Size

Vegetation plot size or transect length, and number of plots installed depend on the purpose of the survey and the characteristics of the vegetation being sampled. See Section 3, Sample Design Form for more information on vegetation plot size.
Call someone on the R1 Analysis Team if you have implementation questions or wish to alter standard transect lengths.

6.3.4 Fixed Area Plot Shape

Circular plots are easiest to install, but the actual plot shape (square, rectangular, or circular) can be customized to suit a specific type of setting. See Section 3, Sample Design Form, for more information on fixed area plot shapes. All plots within a setting must be the same shape to avoid bias.

6.3.5 Training

Generally, crews are not familiar with collecting vegetation composition and surface cover. Be sure to review measurement protocols in the field prior to collecting data.

Conduct calibration of ocular estimates at the outset of the examination. Calibrate ocular estimates by using cover, line-intercept transect methods, or other sampling. The accuracy of the data depends on the training and ability of the examiners. If species data are collected, examiners must be knowledgeable in plant identification. Plant identification skills are critical to accurately assess plant communities and categorize ocular estimates. Estimating canopy cover to the nearest 10 percent cover is relatively easy to learn. Quick comparisons of cover estimates can be made by independently estimating cover for a few species or Lifeforms in a plot and comparing results. Repeat the process until all personnel produce acceptably similar results.

6.4 Vegetation Composition – Cover by Lifeform (Form 1)

Based on the sampling method, determine canopy cover, to the nearest percent, for the following categories (procedures specified below):

- Total Vegetation
- Cover by Lifeform
- Cover by Lifeform by Layer

Exams Cover by Lifeform Form:

Cover by Lifeform | Cover by Species and Layer | Cover by Species

Life Form	Layer	Code	*Cvr%	Remarks
	Total Veg.	TV	6	
Trees		TOT	0	
	Hgt >= 6.1 ft	TOV	0	
	Hgt < 6.1 ft	TSA	0	
Shrubs		TOS	1	
	Hgt >= 6.1 ft	ST	0	
	1.6 ft <= Hgt <= 6.0 ft	SM	0	
	Hgt < 1.6 ft	SL	1	
Forbs		TOF	5	
Graminoids		TOG	1	

Exams Cover by Lifeform Attributes:

Lifeform	Code	Attribute
	TV	**Total of All Vegetation**
Trees:	**TOT**	**Total Tree**
	TOV	**Trees (layer > 6.0 feet)**
	TSA	**Trees (layer ≤ 6.0 feet)**
Shrubs:	**TOS**	**Total Shrub**
	ST	**Shrubs (layer > 6.0 feet)**
	SM	**Shrubs (layer 1.6 – 6.0 feet)**
	SL	**Shrubs (layer ≤ 1.5 feet)**
Forbs:	**TOF**	**Total Forbs**
Graminoids:	**TOG**	**Total Graminoids**

- **Tolerance** (Lifeform): No Errors
- **Tolerance** (Canopy Cover):
  - ± 5 percent for cover ≤ 30%
  - ± 10 percent for cover > 30%
- **Tolerance** (Layer): No Errors

1. **Total Vegetation (TV).** Determine the total canopy cover of all Lifeforms (trees, shrubs, forbs, and graminoids). Only include vegetation and plant parts within the specified plot perimeter (horizontal distance) for fixed-area plots or that intersect the plane for transects, that are alive (or were alive) during the current growing season. Record to the nearest 1 percent.

- **Note:** if using more than one Sample Method to collect Vegetation Composition information, Total Vegetation is not collected.

2. **Canopy Cover by Lifeform (TOT, TOS, TOF, TOG).** Determine the total canopy cover by Lifeform (trees, shrubs, forbs, and graminoids). Examine each Lifeform individually as if the other Lifeforms do not exist. Do not double count overlapping layers within a Lifeform. To determine, estimate the area of ground surface covered by a vertical projection of the canopy for the particular Lifeform. Only include vegetation and plant parts within the specified plot perimeter (horizontal distance), that are alive (or were alive) during the current growing season. Record to the nearest 1 percent. See R1 CSE/IM Field Guide Appendix J for information on correcting for a slope ≥10%.

Note: If there are no species present on the plot for a particular Lifeform, leave the field (TOT, TOS, TOF, or TOG) blank for that Lifeform.

Canopy Cover by Lifeform by Layer (TOV, TSA, ST, SM, SL). Determine the total canopy cover by Lifeform (for trees and shrubs) by Layer (defined below). To determine, estimate the area of ground surface covered by a vertical projection of the canopy within the predefined layer for the particular Lifeform. For each Lifeform, partition plants into layers based on those plants whose heights end in that layer (see Agave Rule below). If a Lifeform does not have members that top out within a layer, record a “0” for canopy cover for that layer (if there are no species in any of the layers for the Lifeform, leave the fields blank for that Lifeform). Only include vegetation and plant parts within the specified plot perimeter (horizontal distance) for sampling method FRQ or that bisect the vertical plane of the transect for sampling method TRN, that are alive (or were alive) during the current growing season. Record to the nearest 1 percent. See R1 CSE/IM Field Guide Appendix J for information on converting slope distance to horizontal distance when on a slope ≥10%.

Layers:

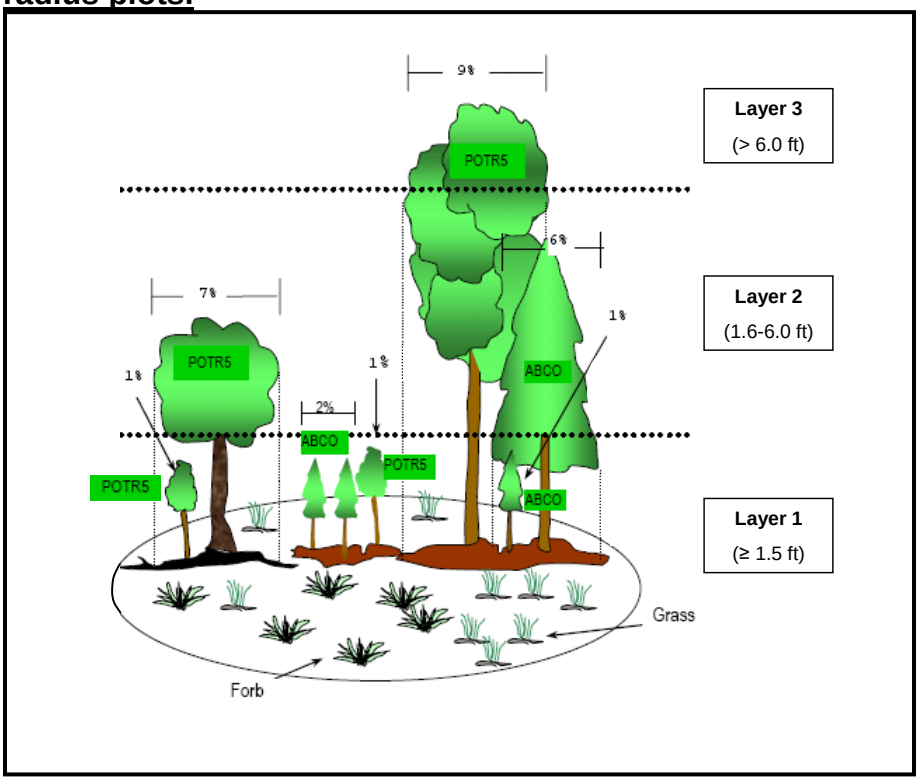
Lifeform	Attribute Code	Layer
Trees:	**TOV**	**> 6.0 feet**
	TSA	**≤ 6.0 feet**
Shrubs:	**ST**	**> 6.0 feet**
	SM	**1.6 – 6.0 feet**
	SL	**≤ 1.5 feet**

Note: For any given Lifeform, different plants of the same Lifeform can be divided into more than one layer. However, parts of an individual plant (e.g., upper half, lower half) cannot be assigned into different layers. See “Agave Rule” below.

Agave Rule – If a plant has a seed head that grows much taller than the rest of the plant, assign the entire plant to the layer where most of the cover occurs (not the layer where the seed head tops out).

Example for figuring out the radius of five percent cover on a 24 ft radius plot: Remember the area of a circle = πr^2, thus the area of a 24 ft radius circle = 3.14 (24^2) = 1808 ft^2. Therefore, five percent of this = 1808 ft^2 (.05) ≈ 90 ft^2 and the radius of a 90 ft^2 circle = $\sqrt{(90/3.14)}$ ≈ 5.4 ft which is approximately the arm span of a 5.5 ft tall person. This same process can be used to determine the area of any percentage of any fixed radius plot.

<u>Example – Cover by Lifeform by Layer using Selection Method = FRQ, fixed radius plots.</u>



Note: For this example, assume that the POTR5 tree (in Layer 1) with 1% crown cover is completely overtopped by the larger POTR5 tree (in Layer 2) with 7% crown cover. Given that percent covers are based on the area of ground surface covered by a vertical projection of the canopy, the cover for the smaller tree would not be added to the TV, TOT, or TSA percent cover estimates. For this example, forbs and grasses have 5% cover each and none of it is overtopped.

Exams Data Entry for Example Above

Lifeform	Code	Attribute	Percent Cover
	TV	Total of All Vegetation	32%
Trees:	TOT	Total Tree	22%
	TOV	Trees (layer > 6.0 feet)	9%
	TSA	Trees (layer ≤ 6.0 feet)	16%
Shrubs:	TOS	Total Shrub	0
	ST	Shrubs (layer > 6.0 feet)	0
	SM	Shrubs (layer 1.6 – 6.0 feet)	0
	SL	Shrubs (layer ≤ 1.5 feet)	0
Forbs:	TOF	Total Forbs	5%
Graminoids:	TOG	Total Graminoids	5%

Example – Cover of Tree Lifeform and by Layer using Selection Method = TRN, line-intercept method.

Count and record the linear feet of transect that intersects the tree canopy in a plane extending vertically above the transect. Do not remove gaps less than 1 foot in length between branches or needles, imagine a tarp is covering the tree and the projection of the tree crown is solid along the transect. If the transect extends past stand boundaries, bend 90 degrees in whatever direction will keep the transect within the stand you are working in. *Every* tree, regardless of height or diameter should be included when assessing total tree canopy cover (TOT). Sum up the total linear feet of transect covered by tree crown and record in the Cover by Lifeform form next to TOT, total tree. Estimate the percent cover in TOV (trees >= 6.1 ft) and TSA (trees <= 6 ft) along the transect. Note that these two fields can add to a total greater than TOT because TOV and TSA can be layered. The screen shot below of the Cover by Lifeform form in Exams shows where to record transect information and how TOV and TSA *can* add to a sum greater than TOT. The paper Vegetation Composition: Cover by Lifeform – Tree Canopy Cover form in the R1 CSE/IM Field Guide Appendix D is used to facilitate tree canopy cover data collection using the transect method.

Cover by Lifeform | Cover by Species and Layer | Cover

Life Form	Layer	Code	*Cvr%
	Total Veg.	TV	32
Trees		TOT	22
	Hgt >= 6.1 ft	TOV	9
	Hgt < 6.1 ft	TSA	16

6.5 Vegetation Composition – Cover by Species (Form 3)

For the plot area specified for vegetation composition on the Sample Design Form, complete the following (procedures specified below):

Base all estimates on the cover of vegetation and plant parts that are (or were) alive during the current growing season, and are located within the specified plot perimeter. Do not include cover of a dead shrub, or portion of a dead shrub (that will not recover), in cover estimates. However, estimate cover for the current season's annual forbs and grass species that have already died. Perennial forbs and grasses may also appear dead, but are actually in an inactive or dormant stage — these plants should also be included in the cover estimates. Only record a species once on this form.

Exams Cover by Species Form:

6.5.1 Species List (species above specified minimum cover %).

For **each** species on the plot area that has a canopy cover above the minimum specified, record the following:

- **Lifeform** (LF) – select the Lifeform (tree, shrub, forb, or graminoid) from the drop-down list.
    - **Species** – record the species PLANTS code; refer to R1 Common Stand Exam Plants List for acceptable species codes. **Note:** See Section 12.2.13 for instructions on how to add species to the acceptable species list.
    - **Cover** (Cvr%) – record canopy cover to the nearest percent. To determine, estimate the area of ground surface area covered by a vertical projection of the canopy for the species. Do not count overlap of crowns within a species.
    - **Layer –** in the **Remarks** column, **record** the **Layer Code** for the layer (listed below) that best represents where most of the cover tops out **Note:** this layer is not necessarily where most of plant biomass occurs. If a plant species occurs equally in more than one layer, record the highest layer where it occurs.

For All Lifeforms

Layer code	Height Class
1	0.0 –1.5 feet
2	1.6 – 6.0 feet
3	> 6.0 feet

6.5.2 Designated Species on a List.

The protocol for collecting Cover by Species data is determined by the Vegetation Exam Level (see Item 2.13.2). Cover by species attributes are collected on designated species for Exam Levels 2 and 3 if they their cover percent meets or exceeds the minimum specified value (subpopulation minimum). They are collected on designated species for Exam Level 4 when they are present. The "list" of species could include

noxious species; invasive plants; threatened, endangered, and sensitive species; and/or species of management interest. Record the following for **each** "designated" species on the list that meets the minimum qualifications determined by the Vegetation Exam Level:

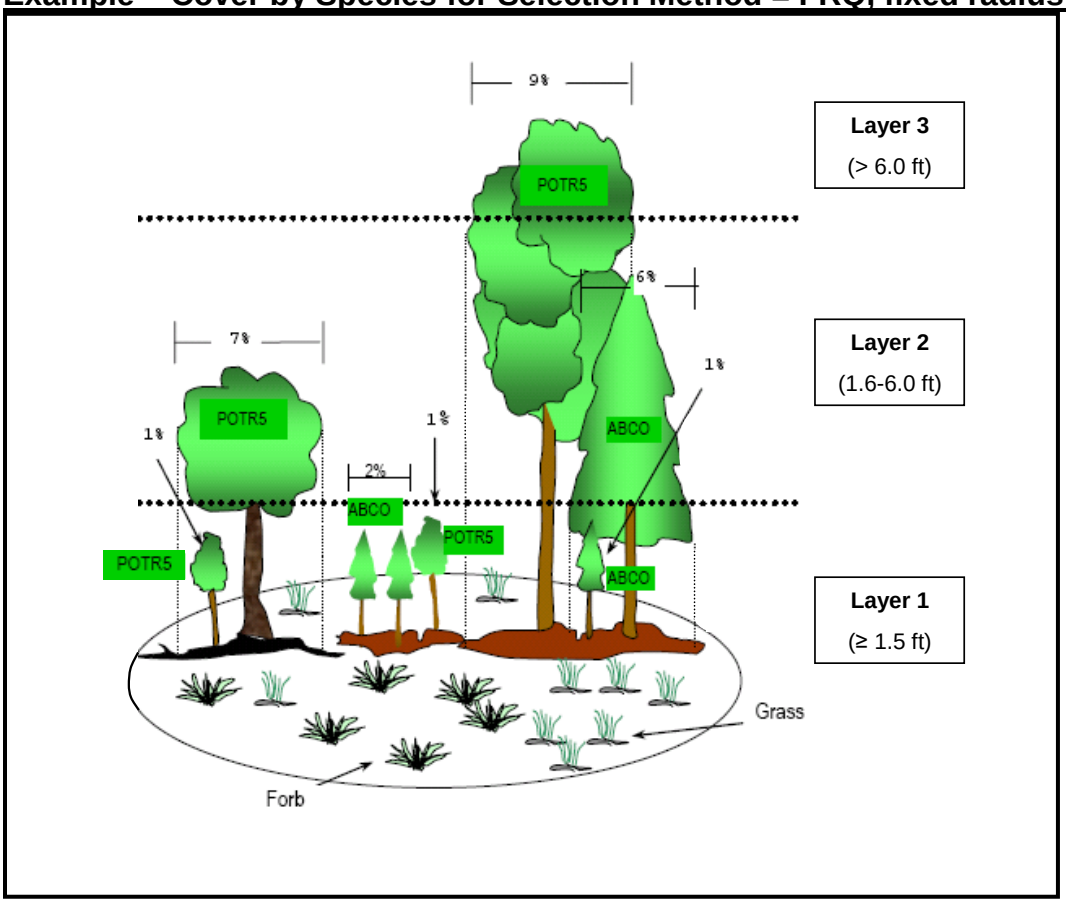
- **Lifeform** (LF) – record Lifeform.
- **Species** – record the species PLANTS code; refer to R1 Intensification Plant List for acceptable species codes
- **Cover** (Cvr%) – record '**.1**' for canopy cover (use this code for all designated species that have less than the minimum percent cover).
- **Layer** – in the **Remarks** column, record the code for the layer that best represents where most of the cover tops out (see Species List above for layer codes). If a designated species occurs equally in more than one layer, record the highest layer where it occurs.

❖ **Tolerance** (Lifeform): No Errors

❖ **Tolerance** (Canopy Cover):
  - ± 5 percent for cover ≤ 30%
  - ± 10 percent for cover > 30%

❖ **Tolerance** (Layer): No Errors
❖ **Tolerance** (Species): No Errors

Example – Cover by Species for Selection Method = FRQ, fixed radius plot.



Note: For this example, assume that the POTR5 tree (in Layer 1) with 1% crown cover is completely overtopped by the larger POTR5 tree (in Layer 2) with 7% crown cover. Given that percent covers are based on the area of ground surface covered by a vertical projection of the canopy, the cover for the smaller tree would not be added to the total POTR5 percent cover estimate.

Lifeform	**Species**	**Cover** Percent	Layer Code
Trees:	**POTR5**	**17%**	3
	ABCO	**8%**	2
Shrubs:	**--**	**0**	--
Forbs:	**ARCO9**	**5%**	1
Graminoids:	**POPR**	**5%**	1

6.6 Ground Surface Cover (Form 4)

Ground surface cover data can be collected using one of the following methods:

6.6.1 Fixed-Radius Plot Method

For this method, the percent of ground surface cover (by cover type category), occurring within a fixed-radius plot area, is determined based on ocular estimates. Refer to Item 6.6.3 for cover type categories.

Procedure: Estimate the percent of ground surface area cover for each of the cover type categories present on the fixed-radius plot area. On the Ground Surface Cover Form in Exams software, record the category (Item 6.6.1) and the GROUND SURFACE COVER PERCENT (Item 6.6.4) for each cover type sampled.

6.6.2 Line-intercept Method

Ground surface cover data (by cover type category) are collected along transects radiating from plot center. Data are then converted to cover percent estimates. Refer to Item 6.6.3 for cover type categories.

Procedure: Complete the following:

Sample Design for Ground Surface Cover Transects

Default Sample Design Form

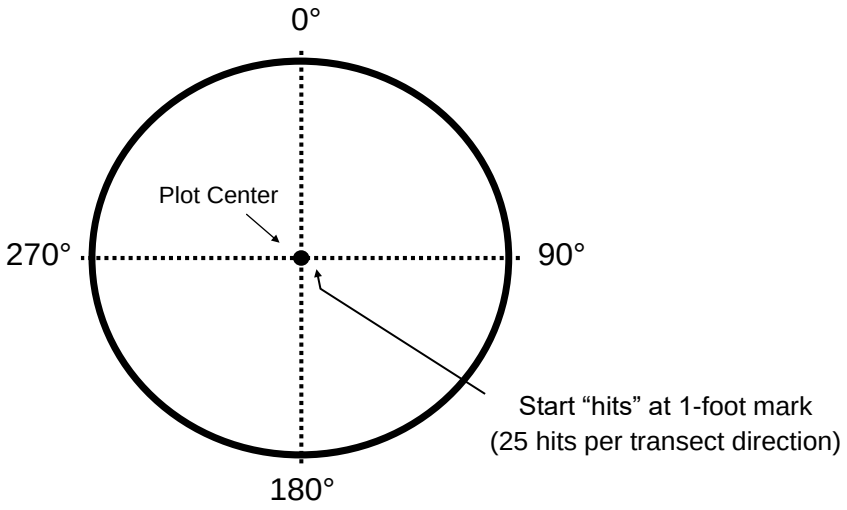
Tree | Veg. Composition | Ground Surface Cover | Down Woody Material (Brown's Survey)

Meth	ExpFac	Azm	Cond.	SubFiltr	Var	MinV	MaxV	Remarks
TPT	100.0000		—		SVC	0.10	100.00	

Ground Surface Cover Point-Intercept Data Collection Form, R1 CSE/IM Field Guide Supplemental Appendix R1-D):

Lay out four transects that extend outward from plot center at azimuths of 0, 90, 180, and 270 degrees, and for a distance of 25.0 feet. Lay a cloth tape along the slope of the ground; for this sample, do not correct the slope distance to obtain horizontal distance.

Ground Surface Cover Transects Configuration



Beginning at the 1-foot mark, place the tip of a plot stake or sharply pointed staff on the ground along the transect line at each 1-foot mark (against the right side of the tape with your back to plot center). Record each point, referred to as a “hit,” on the Ground Surface Cover Sample Form (*R1* supplemental form - R1 CSE/IM Field Guide Appendix R1-D) by the appropriate ground surface cover type category (Item 6.6.1). If more than one category occurs at a point (e.g., litter on top of a rock), always record the ground cover category that is on top (i.e., the category that the pointed staff touches first).
Note: Foliar canopy cover above the soil surface plane is not considered to be ground surface cover.

Repeat procedure for each transect direction. Each of the four transect directions will contain 25 hits (for a total of 100 hits for the entire plot).

❖ **Tolerance** (Ground Surface Cover Transects Sample):
- ± 20% for ocular estimates
- Transect Method Transect Azimuth: ±2 degrees
- Transect Method Number of Hits per category: ± 10 percent
- Cover Type Category: No Errors
- Ground Surface Cover Percent (calculation): ±10 percent

6.6.3 Ground Surface Cover Type Codes and Category Definitions

Valid Ground Surface Cover Type categories and codes (4-character) are as follows.

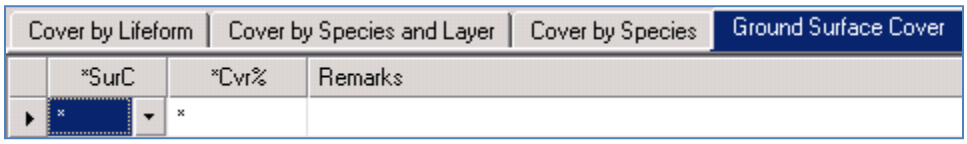
Code	Description	Definition
ASH	Ash (Organic from fire)	Remaining residue after all combustible material has been burned off.
BARE	Bare soil (soil particles < 2 mm)	Bare soil, not covered by rock, cryptogams or organic material. Does not include any part of a road (see definition for road).

Code	Description	Definition
BAVE	Basal vegetation	Basal vegetation not differentiated by Lifeform.
CRYP	Cryptogamic crust	Thin, biotically dominated ground or surface crusts on soil in dry rangeland conditions, e.g. cryptogamic crust (algae, lichen, mosses or cyanobacteria).
DEVP	Developed land	Surface area occupied or covered by any man-made structure other than a road, such as a building, dam, parking lot, electronic site/structure.
LICH	Lichen	Lichens: an organism generally recognized as a single plant that consists of a fungus and an alga or cyanobacterium living in a symbiotic association. For lichen growing on bare soil in dry rangeland conditions, see cryptogamic crusts.
LITT	Litter and duff	Leaf and needle litter, any material < ¼ inch, and duff not yet incorporated into the decomposed top humus layer. Non-continuous litter is not included (for example, scattered needles over soils is classified a BARE).
MOSS	Moss	Nonvascular, terrestrial green plants including mosses, hornworts and liverworts - always herbaceous. This code does not apply to moss growing on bare soils in dry rangeland conditions. For rangeland conditions, see cryptogamic crusts.
PEIS	Permanent ice and snow	Surface area covered with ice & snow at time of plot measurement, considered permanent. For use when permanent ice and snow are not differentiated.
ROAD	Road/Trails	Improved roads, paved roads, gravel roads, improved dirt roads and off-road vehicle trails regularly maintained or in long-term continuing use. May be constructed using machinery. Includes cutbanks and fills.
ROCK	Rock	Relatively hard, naturally formed mineral or petrified matter > 1/8 inch in diameter appearing on soil surface as small to large fragments or as relative large bodies, cliffs, outcrops, or peaks. Includes bedrock.
TRIS	Transient ice and snow	Surface area covered by ice and snow at the time of plot measurement, considered transient. For use when permanent ice and snow are not differentiated.
UNKN	Unknown	Other covers not defined elsewhere including trash and garbage.
WATE	Water	Where remaining above the ground surface during the growing season, such as streams, bogs, swamps, marshes and ponds (FIA definition).

Code	Description	Definition
WOOD	Wood	Woody material, slash and debris; any woody material, small and large woody debris, regardless of depth. Litter and non-continuous litter are not included (for example, scattered needles over soil is classified as BARE).

6.6.4 Ground Surface Cover Percent

On the Ground Surface Cover Form in the Exams software, record the category (Item 6.6.1) and the GROUND SURFACE COVER PERCENT (Item 6.6.2) for each cover type sampled. The surface cover percentages for all categories sampled on a plot MUST total 100 percent. Use the paper **Ground Cover Sample Form** found in the R1 CSE/IM Field Guide Appendix R1-D.



For the **Transects Method**, after all of the "hits' for each of the four ground surface cover transects sample have been recorded on the supplemental form, determine a GROUND SURFACE COVER PERCENT for each cover type category sampled, as described below.

- **Category Total for Each Transect –** By category, sum the number of hits sampled on each of the four transects individually and enter these values in the Total column for each transect. Add the Total values for each transect together for each category and add this sum to the Plot Total column to obtain the "total number of hits for category" on the plot. *Record these category totals on the supplemental form.*

- **Category GROUND SURFACE COVER PERCENT –** By category, determine the cover percent value associated with the total number of hits sampled:

Category Cover Percent = Total # hits for category

Because the "number of hits for all categories is 100," the "cover percent" value for a category calculates to the same number as the "total number of hits" for the category. Therefore, the category cover percent is simply:

For example, if the total number of hits across all four transects for the LITT category (litter and duff) is 20, then the associated cover percent value on the plot for that category is 20%.

- **“Cover %” Entry –** On the Ground Surface Cover Form in Exams software, record the cover percent value (GROUND SURFACE COVER PERCENT) in the “Cover %” column, by category.

NOTE: Prior to entering the GROUND SURFACE COVER PERCENT for each cover type category in Exams software, verify that all of the individual category percent values sum to 100 percent.

Section 7: Down-Woody Materials Form – All Exam Levels

Downed-woody materials include dead twigs, branches, stems, boles of trees, and brush that have fallen and lie on or above the ground. If a down-woody inventory is taken, information must be collected on all of the plots in the stand.

The tolerance listed for items in this section is "No Errors" unless otherwise noted.

7.A Brown's Protocol (Sample Design and Transect Layout, DWM Exam Level 2)

Brown's Protocol is a planar intercept method which counts intersections of woody pieces with vertical sampling planes. The sampling plane lengths (transects) can be varied by users to obtain the desired sampling precision. See R1 CSE/IM Field Guide Appendix S of this field guide for additional information on sampling plane lengths and accuracy.

Example Brown's Sample Design

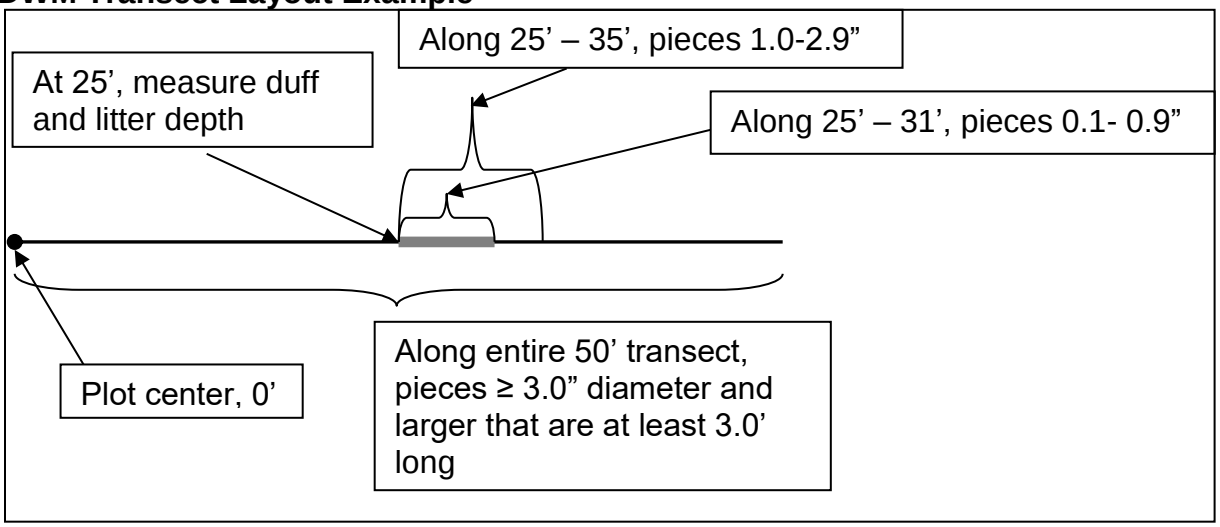
Tree | Veg. Composition | Ground Surface Cover | Brown's Survey | Photo Series | Piece Count

Meth	ExpFac	Azm	Cond.	SubFiltr	Var	MinV	MaxV	Remarks
TRN	12.0000	0	---	DOWN	DIA	0.01	0.24	
TRN	12.0000	0	---	DOWN	DIA	0.25	0.99	
TRN	20.0000	0	---	DOWN	DIA	1.00	2.99	
TRN	100.0000	0	---	DOWN	DIA	3.00	999.99	

Based on the sample design above, this transect layout would contain 100 feet of transect for sampling DWM pieces at least 3.0 inches in diameter, 20 feet of transect for sampling DWM pieces from 1.0-2.9 inches in diameter, and 12 feet of transect for sampling DWM pieces from 0.1-2.9 inches in diameter.

See the following figure for an example of how this transect could be laid out on the ground. In this example, two 50 foot *horizontal distance* transects would be installed radiating from the plot center. Transects installed on slopes >10% must be corrected for slope. See R1 CSE/IM Field Guide Appendix J for information on how to correct for slope.

DWM Transect Layout Example



7.B Brown's Protocol (Setting Form, Item 2.13, DWM Exam Level 2)

The DWM Exam Level on the Setting Form must be set to 2 to indicate collecting DWM attributes according to Brown's Protocol. See R1 CSE/IM Field Guide Appendix B for an example Sample Design for collecting DWM according to Brown's Protocol. For more information on Brown's Protocols refer to *General Technical Report GTR-INT-16.*

Down-Woody Form Required Fields (Brown's Protocols):

For all exams requiring Brown's Transect information, Exam Level 2, the minimum required fields for Region 1 are listed below. These fields yield data that allow fuel loading to be calculated. Refer to individual items for additional definitions and field procedures.

Item No.	Field	Brown's Protocols
7.1	Plot Number	X
7.2	First Duff	X
7.3	Second Duff	X
7.4	Fuel Depth	X
7.5	1-Hour (0.01 to 0.24 inch)	X
7.6	10-Hour (0.25 to 0.99 inch)	X

Item No.	Field	Brown's Protocols
7.7	100-Hour (1.00 to 2.99 inches)	X
7.8	Piece Count	3.0-inch diameter and larger
7.9	Log Decay Class	3.0-inch diameter and larger
7.10	Diameter	3.0-inch diameter and larger

If down logs per acre needs to be calculated, such as for wildlife, PIECE LENGTH (7.11) (at a minimum) and DIAMETER LARGE END (7.12), should be collected in addition to the items listed above. The Exam Level is still considered 2, Brown's, but includes additional attributes to meet further wildlife analysis needs.

7.1 Plot Number (3-digit) *Required*

Record the unique plot number where the information is being collected. This field is required only on paper forms.

7.2 and 7.3 First Duff and Second Duff (2,1-digit; xx.y) *Required*

Record FIRST DUFF and SECOND DUFF to the nearest 0.1 inch. In Region 1, these measurements include duff *and* litter, from mineral soil to the top of the litter layer. If there is no duff and litter, be sure to enter a 0, do not leave the field blank.

Duff is the fermentation and humus layers of the forest floor. It does not include the freshly cast material in the litter layer. The top of the duff is where needles, leaves and other castoff vegetative material have noticeably begun to decompose. Individual particles usually will be bound by fungal mycelium. When moss is present, the top of the duff is just below the green portion of the moss. The bottom of the duff layer is mineral soil.

Procedure: Carefully expose a profile of the forest floor for the measurement. A knife or hatchet helps, but is not essential. Avoid compacting or loosening the duff profile where the depth is measured, measure a clean profile from mineral soil to the top of the litter layer. Take the **FIRST DUFF measurement at 1 foot** from the sample plot center, and record it in the "First Duff" column. Take the **SECOND DUFF measurement at 6 feet** from sample plot center, and record it in the "Second Duff" column. When stumps, logs, and trees occur at the plot of measurement, offset 1 foot perpendicular to the right of the sampling plane (with your back to plot center). Include portions of rotten logs in the depth measurement if the central axis of the rotten log is in the duff layer.

- **Tolerance (First Duff, Second Duff):** ± 1/2 inch

7.4 Fuel Depth (2,1-digit; xx)

Record the total vertical dead fuel depth, in inches, to the nearest whole inch. Average the fuel depth, along the longest DWM transect, and record the average depth. Fuel

begins at the top of the duff layer, and includes litter, fine-woody debris, course-woody debris, and dead-woody shrubs. The fuelbed does *not* include dead hanging branches from standing trees. Dead branches on live and dead trees still attached to the ground (i.e., standing) are not included. On suspended logs (e.g., spanning a ravine), the depth is the distance between the top of the duff layer and the top of the log. This information may be used to inform the assignment of fuel model at a later time i.e., in the office. This value is not used in calculating tons per acre values.

- **Tolerance (Fuel Depth):** ± 20 percent of the total depth

7.5 1 Hour (0.01 to 0.24 inch) (3-digit) *Required*

Record the number of small twig ions for each transect. Small twigs are defined as pieces that have a cross section diameter of less than ¼ inch (0.01 to 0.24 inch) at the point of ion with the sampling plane. See R1 CSE/IM Field Guide Appendix S in this manual for more information on DWM including tally rules for DWM.

- **Tolerance (1-Hour):** ± 40 percent

7.6 10 Hour (0.25 to 0.99 inch) (3-digit) *Required*

Record the number of large twig ions for each transect. Large twigs are defined as pieces that have a cross section diameter of between 0.25 and 0.99 inch inclusive at the point of ion with the sampling plane. See R1 CSE/IM Field Guide Appendix S in this manual for more information on DWM including tally rules for DWM.

- **Tolerance (10-Hour):** ± 30 percent

7.7 100 Hour (1.00 to 2.99 inches) (3-digit) *Required*

Record the number of branch ions for each sampling plot. Branches are defined as pieces with a cross section diameter of between 1.0 and 2.99 inches inclusive at the point of ion with the sampling plane. See R1 CSE/IM Field Guide Appendix S in this manual for more information on DWM including tally rules for DWM.

- **Tolerance (100-Hour):** ± 20 percent

7.8 Piece Count (3-digit) *Required*

Record the number of large pieces (≥ 3 inches in diameter, or as stated on the Sample Design Form). “Sound” and “Rotten” pieces should be tallied separately. These pieces can be grouped according to Brown's transect rules, or as specified in the Sample Design Form. Note: If pieces are touching, considered them to be one piece. See R1 CSE/IM Field Guide Appendix S in this manual for more information on DWM including tally rules for DWM.

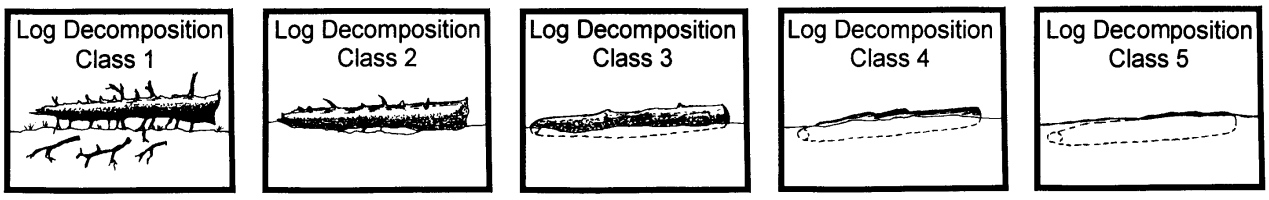
- **Tolerance (Piece Count):** ± 10 percent of total pieces

7.9 Log Decay Class (1-character) *Required*

Record a LOG DECAY CLASS code to indicate the decay stage for large-woody pieces (≥ 3 inches in diameter, or as stated on the Sample Design Form).

Log Decay Classes are defined as follows:

Class Code	Bark	Texture	Twigs	Shape	Wood Color	Portion of log on ground
1	Intact	Intact	Present	Round	Original	None, elevated on supporting points
2	Intact	Intact to soft	Absent	Round	Original	Parts touch, still elevated, sagging slightly
3	Trace	Hard large pieces	Absent	Round	Original to faded	Bole on ground
4	Absent	Soft blocky pieces	Absent	Round to oval	Light brown to faded brown	Partially below ground
5	Absent	Soft, powdery	Absent	Oval	Faded light yellow or gray	Mostly below ground



❖ **Tolerance (Log Decay Class):** ± 1 class

7.10 Diameter (3,1-digit; xxx.y) *Required*

Record the diameter at the point of ion with the transect line for large-woody pieces (≥ 3 inches in diameter, or as stated on the Sample Design Form). Record the diameter to the nearest inch. Note: For frequency measurement, record the midpoint diameter.

Diameter is most commonly measured by holding a tape above the log at a position perpendicular to the length.

❖ **Tolerance (Diameter):**

- Pieces < 20.0-inch diameter: ± 3 inches
- Pieces ≥ 20.0-inch diameter: ± 20 percent

7.11 Piece Length (3,1-digit; xxx.y)

Record length to the nearest 0.1 foot to a 3” diameter top for large-woody pieces (≥ 3 inches in diameter, or as stated on the Sample Design Form).

❖ **Tolerance** (Piece Length): ± 10 percent

7.12 Diameter Large End (3,1 digit; xxx.y)
Record the large-end diameter, to the nearest inch for large-woody pieces (≥ 3 inches in diameter, or as stated on the Sample Design Form).

❖ **Tolerance** (Diameter – Large End): ± 1 inch

7.13 Diameter Small End (3,1 digit; xxx.y)
For large-woody pieces (≥ 3 inches in diameter, or as stated on the Sample Design Form).
record the small-end diameter, to the nearest inch, do not record less than 3" diameter because when a piece is less than 3" diameter, it is no longer a 1000 hour fuel.

❖ **Tolerance** (Diameter – Small End): ± 1 inch

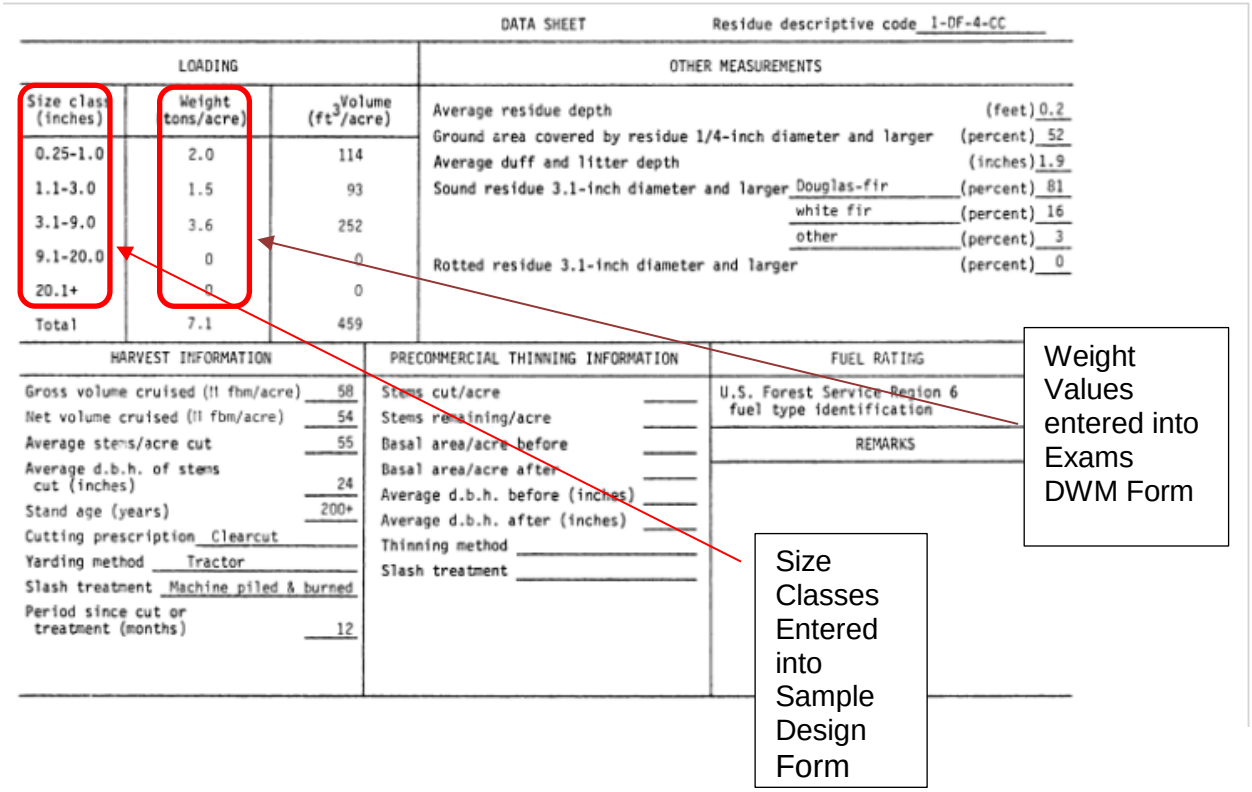
Note: Fuel Photo Series photo number is ***not*** recorded on the Down Woody Material Form, it is recorded on the Plot Form under Residue Description Code. See Section 4.12 Plot Fuel Model for more information.

7. C Using Photo Series to Collect Custom Weight Classes (Setting Form DWM Exam Level 1, Item 2.13)
If you are collecting custom fuel loadings by size class, use the Down-Woody Material Form with an Exam Level of 1, Fuel Photo Series. This option is available for use when the Data Sheet associated with one photo in a fuel photo series guide does not accurately reflect all of the fuel loadings by size classes in a setting. This option allows the use of size class fuel loading values from multiple photos within one fuel photo series guide. For example, this option would be used to enter the fuels weight values (tons/acre) for the 0.25 – 1.0, and 1.1 – 3.0 size classes from one photo data sheet and the fuels weight values for the remaining fuel size classes (3.1 - 9.0, 9.1 – 20.0, and 20.1+) from another photo data sheet.

Note: these custom weight values are not included in the FVS Ready Database or in an R1 Stand Exam Summary Database, will not be summed to produce a total weight value for the stand, thus they must be analyzed by the user. When using this option, do not record Residue Description Code on the Plot Form.

Note: If a single fuel photo data sheet accurately represents conditions found on each plot, the standard Fuel Photo Series is recorded in the Plot Residue Description Code and Setting Form DWM Exam Level = 0, see Item 2.13.3, should be used.

When collecting fuels data using the Photo Series Custom Weight Classes, the size classes entered into the Exams DWM sample design form are based on the values in the data sheets in the applicable photo reference guide (see the data sheet example below).



DATA SHEET — Residue descriptive code 1-DF-4-CC

LOADING		
Size class (inches)	Weight (tons/acre)	Volume (ft^3/acre)
0.25-1.0	2.0	114
1.1-3.0	1.5	93
3.1-9.0	3.6	252
9.1-20.0	0	0
20.1+	0	0
Total	7.1	459

OTHER MEASUREMENTS		
Average residue depth	(feet)	0.2
Ground area covered by residue 1/4-inch diameter and larger	(percent)	52
Average duff and litter depth	(inches)	1.9
Sound residue 3.1-inch diameter and larger: Douglas-fir	(percent)	81
white fir	(percent)	16
other	(percent)	3
Rotted residue 3.1-inch diameter and larger	(percent)	0

HARVEST INFORMATION	
Gross volume cruised (11 fbm/acre)	58
Net volume cruised (11 fbm/acre)	54
Average stems/acre cut	55
Average d.b.h. of stems cut (inches)	24
Stand age (years)	200+
Cutting prescription	Clearcut
Yarding method	Tractor
Slash treatment	Machine piled & burned
Period since cut or treatment (months)	12

PRECOMMERCIAL THINNING INFORMATION	
Stems cut/acre	
Stems remaining/acre	
Basal area/acre before	
Basal area/acre after	
Average d.b.h. before (inches)	
Average d.b.h. after (inches)	
Thinning method	
Slash treatment	

FUEL RATING: U.S. Forest Service Region 6 fuel type identification

REMARKS

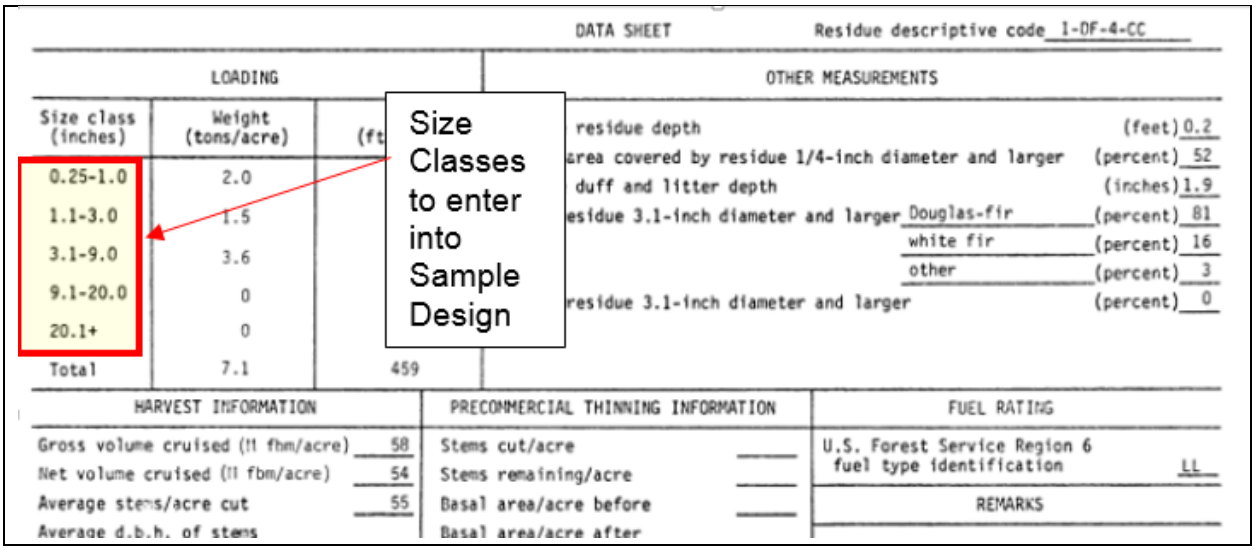
Sample Design: In the Sample Design Form, select the Photo Series tab and set the selection method to FRQ and the Expansion Factor (ExpFac) to 1.00 for 1 acre. Set the minimum and maximum intersection diameters to the piece size classes that correspond with the photo series being used. See the following screenshot for an example.

Example Sample Design

Tree | Veg. Composition | Ground Surface Cover | Down Woody Material (Photo Series)

Meth	ExpFac	Azm	Cond.	SubFiltr	Var	MinV	MaxV	Remarks
FRQ	1.0000	45	---	DOWN	DIA	0.25	1.00	photo series size classes
			OR	DOWN	DIA	1.10	3.00	
			OR	DOWN	DIA	3.00	9.00	
			OR	DOWN	DIA	9.10	20.00	
			OR	DOWN	DIA	20.10	999.00	

The sample design above is based on the data sheet below from a photo reference guide. The size classes are taken from the Size Class column under the Down and Dead Woody Fuel Loadings box highlighted in yellow below.



DATA SHEET Residue descriptive code 1-DF-4-CC

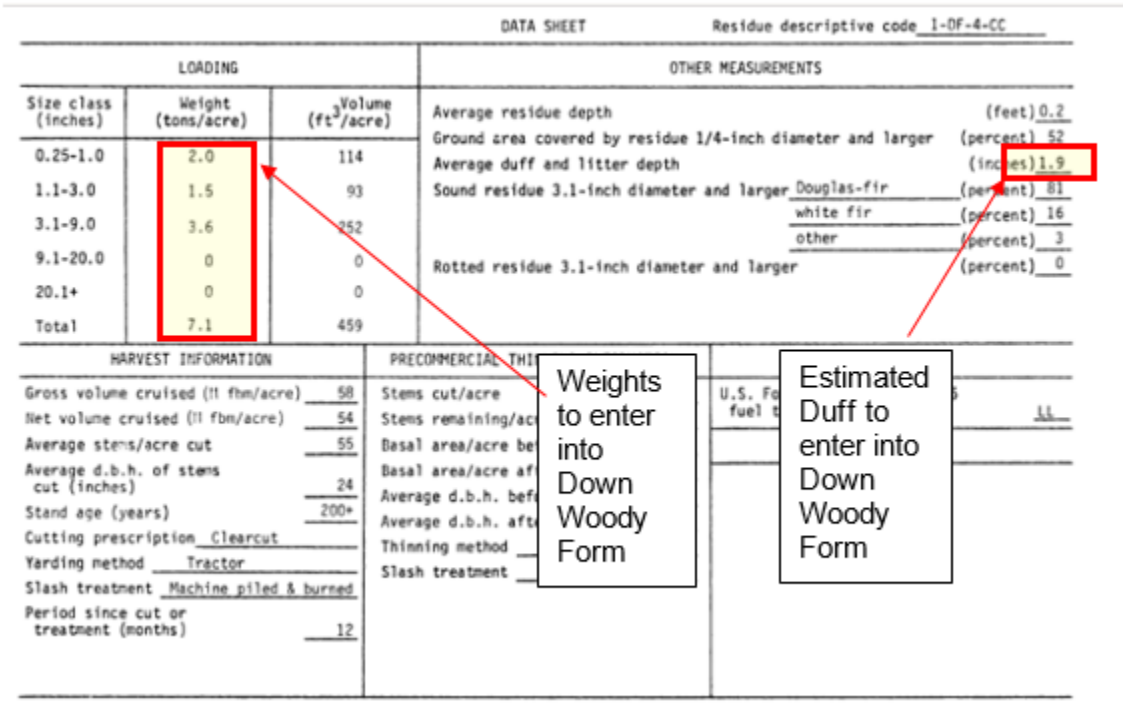
LOADING		
Size class (inches)	Weight (tons/acre)	(ft
0.25-1.0	2.0	
1.1-3.0	1.5	
3.1-9.0	3.6	
9.1-20.0	0	
20.1+	0	
Total	7.1	459

Size Classes to enter into Sample Design

OTHER MEASUREMENTS		
residue depth		(feet) 0.2
area covered by residue 1/4-inch diameter and larger		(percent) 52
duff and litter depth		(inches) 1.9
esidue 3.1-inch diameter and larger	Douglas-fir	(percent) 81
	white fir	(percent) 16
	other	(percent) 3
residue 3.1-inch diameter and larger		(percent) 0

HARVEST INFORMATION		PRECOMMERCIAL THINNING INFORMATION		FUEL RATING	
Gross volume cruised (!! fbm/acre)	58	Stems cut/acre		U.S. Forest Service Region 6 fuel type identification	LL
Net volume cruised (!! fbm/acre)	54	Stems remaining/acre		REMARKS	
Average stems/acre cut	55	Basal area/acre before			
Average d.b.h. of stems		Basal area/acre after			

The fuel photo series data will be entered on the DWM Form. Weights for each size class are values found on the Data Sheet in the applicable photo reference guide in the Weight column in the Down and Dead Woody Fuel Loadings Box.



DATA SHEET Residue descriptive code 1-DF-4-CC

LOADING		
Size class (inches)	Weight (tons/acre)	Volume (ft^3/acre)
0.25-1.0	2.0	114
1.1-3.0	1.5	93
3.1-9.0	3.6	252
9.1-20.0	0	0
20.1+	0	0
Total	7.1	459

OTHER MEASUREMENTS		
Average residue depth		(feet) 0.2
Ground area covered by residue 1/4-inch diameter and larger		(percent) 52
Average duff and litter depth		(inches) 1.9
Sound residue 3.1-inch diameter and larger	Douglas-fir	(percent) 81
	white fir	(percent) 16
	other	(percent) 3
Rotted residue 3.1-inch diameter and larger		(percent) 0

HARVEST INFORMATION	
Gross volume cruised (!! fbm/acre)	58
Net volume cruised (!! fbm/acre)	54
Average stems/acre cut	55
Average d.b.h. of stems cut (inches)	24
Stand age (years)	200+
Cutting prescription	Clearcut
Yarding method	Tractor
Slash treatment	Machine piled & burned
Period since cut or treatment (months)	12

Weights to enter into Down Woody Form

Estimated Duff to enter into Down Woody Form

See the screenshot of the data from the data sheet entered into the Down Woody Material Form in Exams. Note: values of zero will be treated as nulls.

Down Woody Material Data; Setting: 01050108099999_08/04/2014 Plot: 0001

Photo Series

Diam. Classes	Duf1	Duf2	FuD	*Wgt	*Vol
	1.9	1.9			
0.25 - 1.00				2.0	
1.10 - 3.00				1.5	
3.10 - 9.00				3.6	
9.10 - 20.00					
20.10 +					

7.14 and 7.15 First Duff and Second Duff (2,1-digit; xx.y) Required
Record the duff, in inches to the nearest 0.1-inch. See Section 7.2 and 7.3 above for detailed information on taking these measurements. The duff values in the photo series sheet may be used but will not be as accurate as actual measurements.

7.16 Fuelbed Depth (2,1-digit; xx.y)
Record the total vertical fuel depth (fuelbed), to the nearest 0.1 inch, as specified in Item 7.4.

7.17 Weight (5,1-digit; xxxxx.x) *Required*
This is the average tons per acre for each size class. Enter these values as tons/acre. The weight values for each size class are found in the Data Sheet associated with the photo that best represents the fuel conditions on the plot. These values will be located in the **Down & Dead Woody Fuel Loadings** box in the **Weight** column in the Data Sheet. If using a photo series guide for appraising thinning slash, weight values are located in the **Debris Loading** box under the **Weight** heading. Most guides provide both metric and English units. See the example Data Sheet below as an aid for locating the weight information.

Weight Conversion Factor for Metric to English Units

$$1 \frac{m^3}{ha} = 14.2913 \frac{ft^3}{ac}$$

7.18 Volume (8,1 digit)
These values are ***not*** required to be recorded. The information is not available in the FVS input database or used in the R1 Stand Exam Summary Database. If collected, these entries are the average volume per acre in each diameter class as determined by the fuel photos. Enter these values in cubic feet/acre. The volume entries for each size class are found in the Data Sheet associated with the photo that best represents the fuel conditions on the plot. These values will be located in the **Other Fuel Data** box in the Data Sheet. If using a photo series guide for appraising thinning slash, volume values are located in the **Utilization of Potential Debris Larger than 3-inch Diameter**

box under Volume. Some guides provide both metric and English units. Always enter English units. If only metric units are provided in the photo series guide, use the conversion formula provided below to convert the data.

Volume Conversion Factor for Metric to English Units

$$1 \frac{Kg}{m^2} = 4.4609 \frac{tons}{ac}$$

Section 8: Tree Data Form – Extensive Exam Level

The required fields and tolerance limits listed in this section are for the **Extensive** examination level. Unless otherwise noted in this section, the tolerance limits are the same as those listed for the Intensive exam. Refer to Item 2.13.1 (Required Fields for the Tree Data Form by Exam Level) for a list of minimum data requirements for an Extensive Exam Level on the Tree Data Form. Additional attributes may be collected as needed to meet the information needs of the exam.

Do not record tree data items for plots that do not contain sample trees (or off-plot site trees).

Exam Purpose (SE or CI): When taking any level of examination that includes the Tree Data Form, and the EXAM PURPOSE (Item 2.14) is code “SE” or “CI” (Stand Exam or Stratified Random Sample), all size classes of trees in the setting area must be represented in the overall sample.

8.1 Plot Number (3-digit) *Required*

Required only on paper forms. Record the PLOT NUMBER for each line of tree data. Plot numbers must be unique within a setting.

8.2 Tag ID Number (4-digit) *Required*

Required only on paper forms. Tag ID numbers will be autopopulated sequentially by Exams on a PDR. Record a unique TAG ID NUMBER for each sample tree, or tree group (if appropriate). Tag ID is the consecutive numbering of the tree data lines for each plot beginning with "01" from true North. The numbering sequence is repeated on each plot.

8.3 Tree Status (1-character) *Required*

Record a TREE STATUS code to identify each sample tree as live or dead.

Code	Tree Status	Description
L	Live	Trees that have at least one green point of growth. Includes deciduous trees that have lost their foliage for the season, and trees that have recently lost their leaves to defoliators but will re-flush.
D	Dead	Trees without a green point of growth. Note: Many of the Tree Data fields are not recorded for dead trees; a SNAG DECAY CLASS (Item 5.20) is required for Extensive and Intensive Exam levels.

8.6 Tree Species (8-character) *Required*

Record the TREE SPECIES code for each sample tree. See the R1 CSE/IM Field Guide Appendix H for common tree species codes found in Region 1.

Examples:

Code	Species Type
ABGR	Grand fir (Abies grandis)
PIPO	Ponderosa pine (*Pinus ponderosa*)

Temporary Species Codes: If the species for a tree cannot be determined at the time of the field visit, measure the tree, and temporarily use one of two generic TREE SPECIES codes: **2TE (evergreen)**, or **2TD (deciduous)**. Make a note to update the species code in FSVeg once the data is loaded, unless you are able to identify the tree before it is loaded into FSVeg and you can edit the species code in ExamsPC. Collect branch samples, foliage, cones, flowers, bark, etc., to bring to a local botanist for identification.

8.7 Tree Count (3-digit) *Required*

- **Tolerance (**Missed/Extra Tree):

Number of Trees on Plot	Diameter (DBH)	Height or Height Class	Missed/Extra Tree Tolerance
0	NA	NA	No Errors
1 - 10		≤ 0.5 feet	± 5 trees
11+		≤ 0.5 feet	± 50%
1 - 10	< 0.5 inches	> 0.5 feet	± 2 trees
11+	< 0.5 inches	> 0.5 feet	± 20%
1 - 10	0.5 in - Breakpoint DBH	All	± 2 trees
11+	0.5 in - Breakpoint DBH	All	± 20%
1+	Breakpoint DBH +	All	No Errors

8.9 DBH (3,1-digit) *Required*

❖ **Tolerance** (DBH):

DBH (range)	Tolerance
< 0.5 inch	No Errors
0.5 - 13.9 inches	± 1 inch
14.0 - 23.9 inches	± 2 inches
24.0 - 34.9 inches	± 3 inches
35.0+ inches	± 4 inches
Borderline variable-plot trees	± 0.1 inch (to determine trees in or out)

8.10 Height (3-digit)

Required for trees < 4.5 ft. tall.

❖ **Tolerance** (Height): ± 20 percent of actual standing tree height

8.11 Height to Crown *if collected* (3-digit)

❖ **Tolerance** (Height to Crown): ± 20 percent of actual crown height

8.12 Radial Growth *if collected* (2-digit)

If collected, the GST selection guidelines listed for the Intensive Exam must be followed (refer to Item 5.5 for GST selection guidelines; refer to Item 5.12 for procedures on measuring RADIAL GROWTH).

❖ **Tolerance** (Radial Growth): ± 1/20th inch

8.14 Height Growth *if collected* (2,1-digit)

If collected, the GST selection guidelines listed for the Intensive Exam must be followed (refer to Item 5.5 for GST selection guidelines; refer to Item 5.14 for procedures on measuring HEIGHT GROWTH).

❖ **Tolerance** (Radial Growth):
- Trees ≥ 6 feet: ± 1 foot
- Trees < 6 feet: ± 0.1 foot

8.15 Tree Age *if collected* (4-digit)

If collected, the GST selection guidelines listed for the Intensive Exam must be followed (refer to Item 5.5 for GST selection guidelines; refer to Item 5.15 for procedures on collecting TREE AGE). Note: If it is necessary to sample age, an Intensive Exam may be a more appropriate exam.

❖ **Tolerance** (Tree Age):
- Trees < 300 years old: ± 10 percent

- Trees ≥ 300 years old: ± 15 percent

8.16 Crown Ratio (3-digit) *Required*

Record CROWN RATIO (to the nearest percent) as the length of the live crown divided by tree height. Live crown length is assessed from the uppermost live leader or branch to the lowest live branch. Visually adjust large openings in the crown or lopsided crowns by transferring lower branches to fill in the holes. Do not excessively compress the live crown length because the crown appears "sparse" or contains "unhealthy" foliage.

Refer to R1 CSE/IM Field Guide Appendix Q for guidelines on measuring crowns.

❖ **Tolerance (Crown Ratio):** ± 10 percent

8.17 Crown Class (2-character) *Required*

Record CROWN CLASS for all live trees. CROWN CLASS is a categorization of a tree based on dominance in relation to adjacent trees in the stand (categories listed below). This dominance is indicated by crown development and amount of light received from above and the sides. Evaluate each tree in the context of its immediate environment (that is, how is the subject tree competing for sunlight or moisture with adjacent trees/shrubs). See CROWN CLASS, item 5.17 for definitions and tolerances.

CROWN CLASS Categories:

Code								
OP	DO	CO	IN	OV	RE	AB	IB	UB

8.20 Snag Decay Class (1-digit) *Required for dead trees*

For standing dead trees (snags), record a SNAG DECAY CLASS code to indicate the condition of the tree. See SNAG DECAY CLASS, Item 5.20 for a detailed description and tolerance.

8.22 Tree Damage Category (2-digit) *Required*

For live trees with damages, record a TREE DAMAGE CATEGORY code(s), based on physical evidence. For recently dead trees (those that have died within the last 5 years), record a TREE DAMAGE CATEGORY to indicate the cause of death. See TREE DAMAGE CATEGORY, Item 5.22 for detailed information and tolerances. Refer to R1 CSE/IM Field Guide Appendix R for a complete listing of TREE CATEGORY and SEVERITY codes that are valid in Region One.

5.25 Tree Damage Severity (2-digit) *Required*

Record if a TREE DAMAGE CATEGORY is recorded (refer to TREE DAMAGE SEVERITY, Item 5.22 for detailed information and tolerances). Refer to R1 CSE/IM Field Guide Appendix R for a complete listing of TREE CATEGORY and SEVERITY codes.

Section 9: Setting Form – Quick Plot Exam Level

The tolerance limits listed for items in this section are for the **Quick Plot** examination level. Unless otherwise noted, the tolerance limits are the same as those listed for the Intensive exam.

The examination level indicated on the Tree Data Form determines the examination level of the Setting Form.

9.13 Examination Level (4-digit) *Required*

Record the examination level that identifies the scope and range of information being collected. The 1st field is the level of TREE data collected, the 2nd field is the level of VEGCOV (Vegetation Composition), the 3rd field is the level of DNWDY (Down-Woody Materials), and the 4 field is the level of SURCOV (Ground Surface Cover).

The examination level may vary for different forms. The examination level indicated on the Tree Data Form determines the examination level of the Setting and Plot Data forms, but it does not necessarily indicate the examination level that is selected for the Vegetation Composition Form.

For the **Tree Data Form**, enter one of the following codes to indicate the examination level.

Code	Description
0	This form was not used
1	Quick Plot Exam
2	Extensive Exam
3	Intensive Exam

Refer to EXAMINATION LEVEL (Item 2.13) for code options for the Vegetation Composition Form, Ground Surface Cover Form, and Down-Woody Materials Form.

9.14 Exam Purpose (2-character) *Required*

9.19 Potential Vegetation (8-digit) *Required*

- **Tolerance (Potential Vegetation):** Accurate to habitat type (series and understory, but exclusive of phase)

9.21 Setting Capable Growing Area (3-digit) *Required*

- **Tolerance** (Setting Capable Growing Area): ± 10 percent

9.24 Setting Aspect (3-digit) *Required*

Code	Quarter-Quadrant
0	Flat
45	Northeast
90	East
135	Southeast
180	South
225	Southwest
270	West
315	Northwest
360	North
999	Indeterminate/No predominant aspect/Undulating

- **Tolerance** (Setting Aspect): ± 45 degrees (1 class)

9.25 Setting Slope (3-digit) *Required*

- **Tolerance** (Setting Slope): ± 15 percent

9.29 Precision Protocol (6-character) *Required*

Record the code for the precision protocol used. The PRECISION PROTOCOL code is determined by the examination level of the **Tree Data Form.**

Examination Level of the Tree Form	Precision Protocol Code
Quick Plot (1)	CSE_Q

If any type of tree diameters and/or tree heights will be “grouped” in any manner not outlined in this manual, or if any of the precision protocols deviate from the standard CSE protocols, contact your CSE Regional contact to discuss how to reflect these modifications in the PRECISION PROTOCOL. Alternate protocols do not affect the per acre values, but will provide information about the “precision” level of measurements. Refer to the CSE User Guide for details on the Precision Protocols.

Section 10: Tree Data Form – Quick Plot Exam Level

The required fields and tolerance limits listed in this section are for the **Quick Plot** examination level. Unless otherwise noted, the tolerance limits are the same as those listed for the Intensive exam. Refer to Item 2.13.1 (Required Fields for the Tree Data Form by Exam Level) for a list of minimum data requirements for a Quick Plot Exam Level on the Tree Data Form. Fields that are *required* are also noted in this section. Additional attributes may be collected as needed to meet the information needs of the exam.

Do not record tree data items for plots that do not contain sample trees.

Exam Purpose: When taking any level of examination that includes the Tree Data Form, and the EXAM PURPOSE (Item 2.14) is code “SE” or “CI” (Stand Exam or Stratified Random Sample / Compartment Inventory), all size classes of trees in the setting area must be represented in the overall sample.

10.1 Plot Number (3-digit) *Required*

Required only on paper forms. Record the PLOT NUMBER for each line of tree data. Plot numbers must be unique within a setting.

10.2 Tag ID Number (4-digit) *Required*

Required only on paper forms. Tag ID numbers will be autopopulated sequentially by Exams on a PDR. Record a unique TAG ID NUMBER for each sample tree, or tree group (if appropriate). Tag ID is the consecutive numbering of the tree data lines for each plot beginning with "01" from true North. The numbering sequence is repeated on each plot.

10.3 Tree Status (1-character) *Required*

Record a TREE STATUS code to identify each sample tree as live or dead.

Code	Tree Status	Description
L	Live	Trees that have at least one green point of growth. Includes deciduous trees that have lost their foliage for the season, and trees that have recently lost their leaves to defoliators but will re-flush.
D	Dead	Trees without a green point of growth. Note: Many of the Tree Data fields are not recorded for dead trees; a SNAG DECAY CLASS (Item 5.20) is required for Extensive and Intensive Exam levels.

10.6 Tree Species (8-character) *Required*

Record the TREE SPECIES code for each sample tree. See the R1 CSE/IM Field Guide Appendix H for common tree species codes found in Region 1.

Examples:

Code	Species Type
ABGR	Grand fir (Abies grandis)
PIPO	Ponderosa pine (*Pinus ponderosa*)

Temporary Species Codes: If the species for a tree cannot be determined at the time of the field visit, measure the tree, and temporarily use one of two generic TREE SPECIES codes: **2TE (evergreen)**, or **2TD (deciduous)**. Make a note to update the species code in FSVeg once the data is loaded, unless you are able to identify the tree before it is loaded into FSVeg and you can edit the species code in ExamsPC. Collect branch samples, foliage, cones, flowers, bark, etc., to bring to a local botanist for identification.

10.7 Tree Count (3-digit) *Required*

For trees ≥ 3.0-inches DBH:

- Quick Plot Exam – record GST and site trees individually; other trees may be recorded in groups as determined by the information needs of the exam.

❖ **Tolerance** (Missed/Extra Trees):

Number of Trees on Plot	Diameter (DBH)	Height or Height Class	Missed/Extra Tree Tolerance
0	NA	NA	No Errors
1 - 10		≤ 0.5 feet	± 5 trees
11+		≤ 0.5 feet	± 50%
1 - 10	< 0.5 inches	> 0.5 feet	± 2 trees
11+	< 0.5 inches	> 0.5 feet	± 20%
1 - 10	0.5 in - Breakpoint DBH	All	± 2 trees
11+	0.5 in - Breakpoint DBH	All	± 20%
1+	Breakpoint DBH +	All	No Errors

10.9 DBH (3,1-digit) *Required*

Estimate DBH for each sample tree and record to the nearest inch. Precisely measure DBH for borderline variable-plot trees to correctly determine TREE COUNT.

❖ **Tolerance** (DBH):

DBH (range)	Tolerance
< 0.5 inch	No Errors
0.5 - 13.9 inches	± 1 inch
14.0 - 23.9 inches	± 2 inches
24.0 - 34.9 inches	± 3 inches
35.0+ inches	± 4 inches
Borderline variable-plot trees	± 0.1 inch (to determine trees in or out)

10.10 Height (3-digit)

- **Tolerance (Height):** ± 20 percent of actual standing tree height

10.16 Crown Ratio (3-digit) *Required*

Record CROWN RATIO (to the nearest percent) as the length of the live crown divided by tree height. Live crown length is assessed from the uppermost live leader or branch to the lowest live branch. Visually adjust large openings in the crown or lopsided crowns by transferring lower branches to fill in the holes. Do not excessively compress the live crown length because the crown appears "sparse" or contains "unhealthy" foliage.

Refer to R1 CSE/IM Field Guide Appendix Q for guidelines on measuring crowns.

- **Tolerance (Crown Ratio):** ± 10 percent

10.20 Snag Decay Class (1-digit) *Required for dead trees*

For standing dead trees (snags), record a SNAG DECAY CLASS code to indicate the condition of the tree. See SNAG DECAY CLASS, Item 5.20 for a detailed description and tolerances.

Section 11: Modifications to Field Guide for 2019

R1 Common Stand Exam and Inventory and Monitoring Field Guide

Section 2: Setting Form

- 2.10 Administrative Forest – Changed Helena NF Administrative Forest Code to the combined forest code for the Helena-Lewis and Clark National Forest (15).
- 2.35 Setting Lat Long Reference Datum – Added clarifying text stating that NAD83 is the Datum used in R1 for inventory data collection.

Section 4: Plot Data Form

- Added Witness Tree/Navigation Information for Inventory and Monitoring protocols.
- Added Navigation Information (from Last Plot) for Inventory and Monitoring protocols.

Section 5: Tree Data Form

- 5.5 Removed all references to site trees because R1 uses habitat type to determine site productivity and yield capacity, not site trees.

Section 10: Tree Data Form – Quick Plot Exam Level

- Included all attributes required for Extensive Exams.
- Included all attributes required for Quick Plots.

Common Stand Exam/Inventory and Monitoring Field Guide Appendices:

- Appendix A: Changed the Helena National Forest and Lewis and Clark National Forest Administrative Forest codes to the combined Helena - Lewis and Clark National Forest Administrative code.
- Appendix K: Added figure and table of some of additional BAFs available when using the American Scale Relaskop.
- Appendix T: Added Plot Witness Tree/Navigation tolerances for IM.
- Appendix T: Deleted the elevation tolerance from “+ 2 contour intervals” to “+100 feet” to make the tolerance an easily verifiable standard.
- Appendix T: Some tolerances that were previously listed as “No Errors” have been changed to “Specify in Protocol/Contract” to indicate that they will be defined, when used, for individual projects in the protocol or contract.
- Appendix T: Added all required attributes to the Tree Data Form Tolerances – Extensive and Quick Plot Exam Levels

R1 Common Stand Exam/Inventory and Monitoring Field Guide Supplemental Appendices:

- Supplemental Appendix D: Modified Seedling Tally Sheet to reflect CSE GST classes.
- Supplemental Appendix G: Moved Plot Witness Tree / Navigation information and Navigation Information (from last plot) to Section 4 in this document.

Section 12: Exams Software Use

This section gives an overview of using Exams software, available for use on either a personal computer or portable data recorder. **The procedure presented below is the only Regionally approved method for converting Common Stand Exam data to an electronic format that can be loaded into FSVeg.**

12.1 Executing Exams Software

Exams software is available at: http://fsweb.nris.fs.fed.us/products/PDR/CSE/installation.shtml. If using a portable data recorder to collect data in the field, be sure to download the latest version of CSE PDR FSVeg Software for the model of Personal Data Recorder you are using, at the beginning of every season. Most of Region 1 uses Juniper System Allegro CX, MX or 2 data recorders. For directions on how to install Exams, refer the *Region 1 Supplement to Chapter 3*.

When opening Exams on your PDR for the first time, Exams will open in common stand exam mode and the background will be red. If the background is blue, you have toggled to the inventory and monitoring side of Exams. Always use common stand exam mode unless you have worked with the R1 Analysis Team on a permanent plot inventory and monitoring measurement plan. You can toggle between common stand exam mode and inventory and monitoring mode by choosing "Use CSE Option" or "Use IM Option" under the file menu in ExamsPDR.

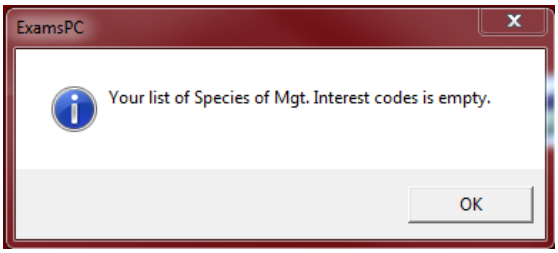
Exams will open a generic template file named SED.data, do not use this file. Choose Open under the File menu and navigate to the STDEXAMS folder on your device, choose the folder with your project's name. Then choose the "*.cse*" file that has been created for your project.

12.2 Editing a template ".cse" or ".im" File

A user may create a template file with specific defaults, tailored drop lists, and field selections. See the R1 Supplement Chapter 3, Section 2: Set up an Exams Template File for detailed information on creating an Exams template file and setting defaults. This can decrease the opportunity for data collection errors. The Exams Template file should be customized in ExamsPC on a computer, not on a handheld device, and then transferred to a PDR once the project template has been completed. Occasionally, minor modifications to a template file may be needed in the field if items were missed in the office.

12.2.1 Editing Species Codes in a Template

The Plant Species List is found under **Setup**>**User Definitions**. All species entered into Exams must be on the TAXA list or they will not load into FSVeg. All R1 template files include the TAXA list, so as long as you start with a Region 1 template, you will be fine. When you first open the user definitions you will see the following message:



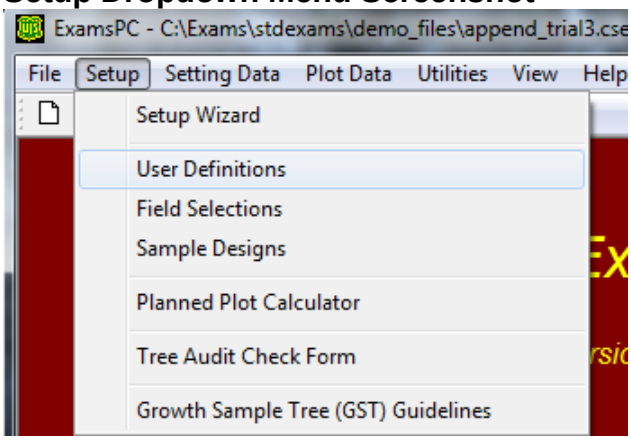
Click **OK,** as the tree species codes are from TAXA.

12.2.2 Making Plant Species Available in an Exams Template.

Crews may encounter plant species that have not been added to the template. The most commonly encountered species should already be available, however, if an unusual species is encountered, crews may need to add species to the template in ExamsPC. Please notify the Analysis Team Protocol Specialist in the event that commonly encountered species are not turned on in the template, so the template can be updated for the next season. All plant species codes are from TAXA.

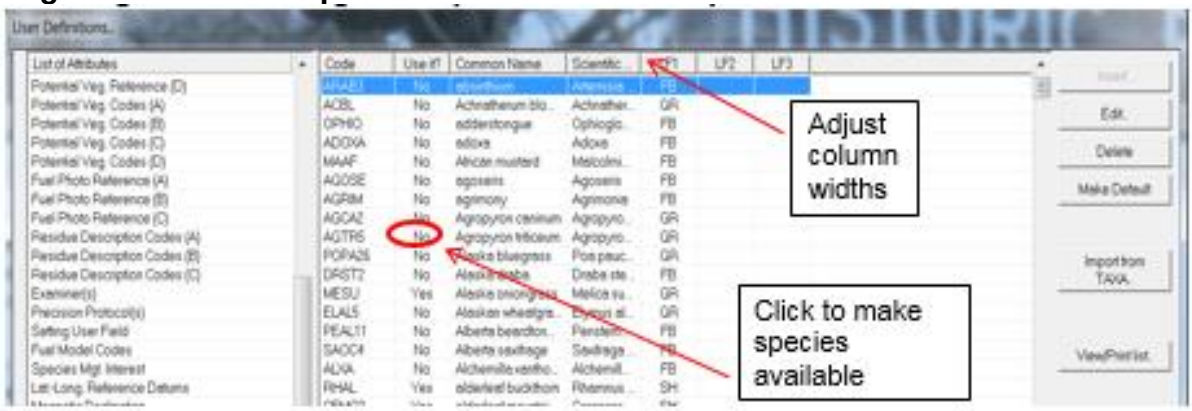
Select **User Definitions** from the **Setup** dropdown menu.

Setup Dropdown Menu Screenshot



Click **OK** if you get a pop-up warning.
Scroll down through the **List of Attributes** and click on **Veg. Species**. The Veg. codes will populate in the **User Definitions** window.

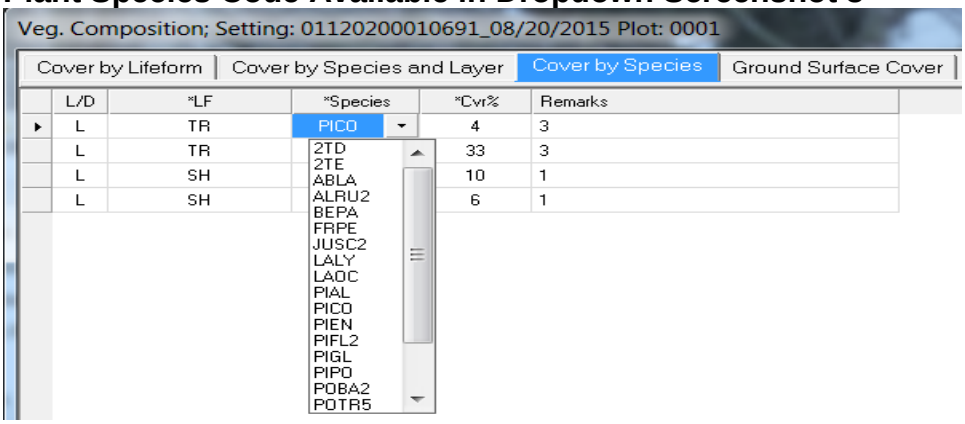
Vegetation Codes Populated in the User Definitions Window Screenshot



The column widths can be adjusted by clicking the column header divider lines and dragging them to where you want them.

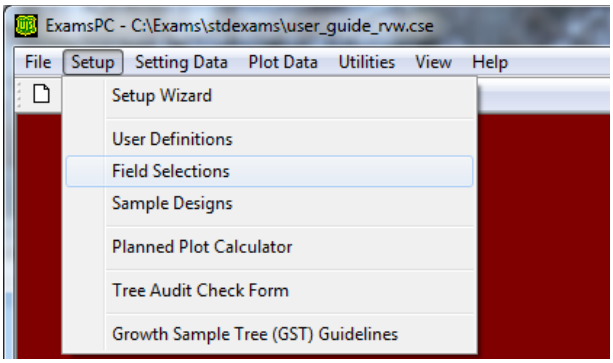
Find the species name you are looking for and simply click **No** in the **Use it?** Column once. This will toggle the **No** to **Yes**, and the species will now be available in the dropdown list available under **Plot Data<Veg Composition|Ground Surface Cover Data<Cover by Species**.

Plant Species Code Available in Dropdown Screenshot 3



12.2.3 Changing Field Selections Available in a Template

From the **Exams** Main Menu, select "**Setup,**" then **"Field Selections**."



Field Selections allows the user to determine which fields are available for data collection on the Plot Data, Tree Data, and Vegetation Composition Forms. See the *R1 Supplement to Chapter 3, Set up an Exams Template File* section for an in-depth discussion of this process.

12.2.4 Field Selection Forms

Selected fields are displayed in the data collection forms of the template. A field must first be "**selected**" before it can be "**required**." Fields with an X in the box in the Selected column will be available in the template. Required fields are checked for completion when exiting the form. An error message appears on the screen if a required field is left blank. When a needed field has been turned on, the field selection form modification must be saved before exiting the form.

Plot Data Field Selection:

Use the **Setup>Field Selections>Plot Form** screen to select the fields to be displayed on the Plot Data Form. Click in the appropriate table cell to toggle the selection as "on" or "off." The Regional Template files have the minimum required fields selected according to R1 Common Stand Exam Protocols set by default. Select "**Next**" to move to the Tree Data Form Field Selection section.

Tree Data Field Selection:

The fields can be chosen by each of the three exam types: Quick Plot Exam, Extensive Exam, and Intensive Exam. Click on the appropriate exam tab (Quick, Extensive, or Intensive) at the top of the screen prior to choosing fields for the specific exam type. Click in the appropriate table cell to toggle the selection as "on" or "off." **SAVE** the selections for the exam type modified before moving on to the next tab.

Vegetation Data Field Selection:

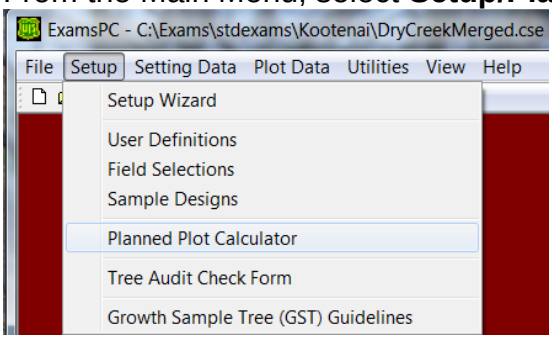
Choose the fields that will be recorded in the selected column by the vegetation exam type: Cover by Lifeform or Cover by Species. Click on the appropriate exam tab at the top of the screen (Cover by Lifeform or Cover by Species), and then click in the appropriate table cell to toggle the selection as "on" or "off. Note: "Cover by Species and Layer" form is not used in Region 1. **SAVE** the selections in each exam type before moving on to the next tab.

See Section 12.3.1.4 for descriptions of the functions of buttons (located at the bottom of the screen).

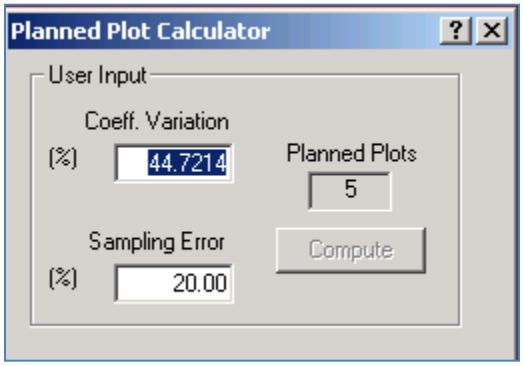
12.2.5 Planned Plot Calculator:

Note: Region One now has a spreadsheet that can be used to explore plot numbers, it is located here: **http://fsweb.r1.fs.fed.us/forest/inv/cse_exams/sampling.htm** and can be used in conjunction with or instead of this national application.

From the Main Menu, select **Setup/Planned Plot Calculator**



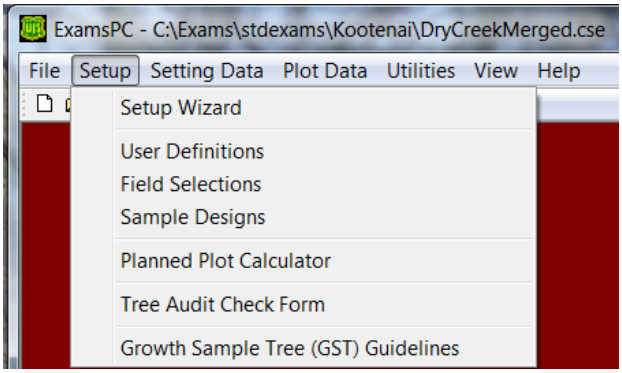
This screen will assist you in determining how many plots you need to install in order to meet a specified Coefficient of Variation (CV) and Sampling Error (E) at approximately the 68% confidence level.



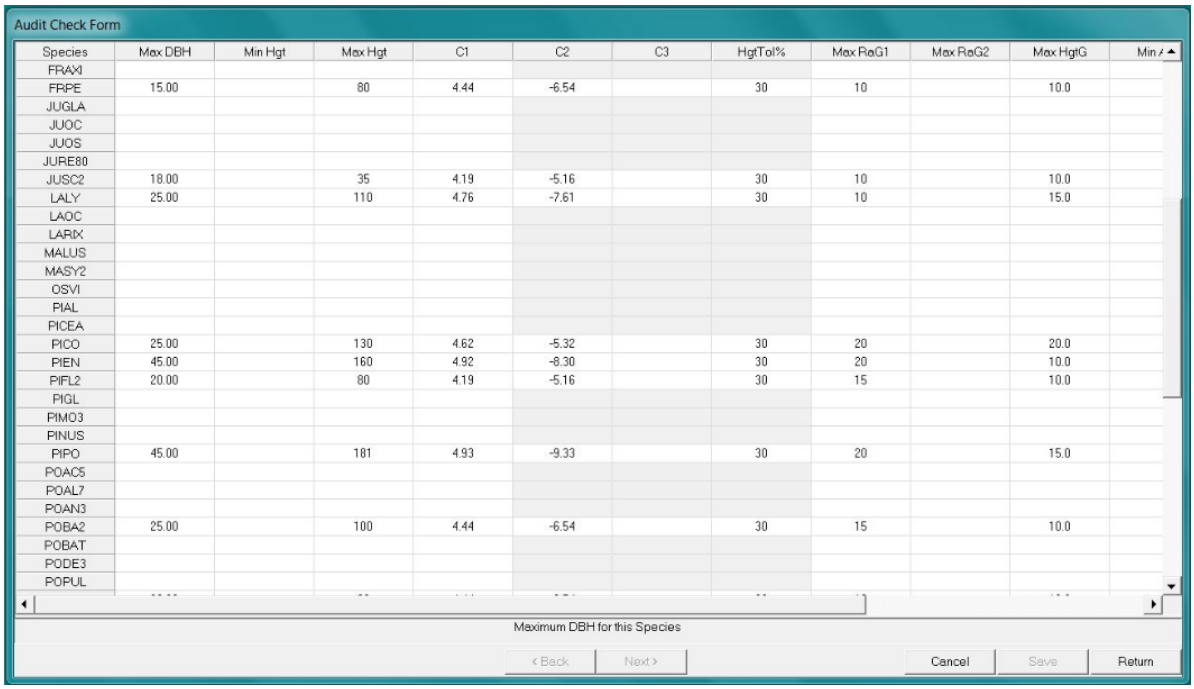
First enter the desired coefficient of variation and sampling error values.
Then select the "**Compute**" button.

The number of plots required, to achieve the desired coefficient of variation and sampling error at the 68% level, is displayed in the "**Planned Plots**" field.

From the Main Menu, select **Setup** and select **Tree Audit Check Form.**



The Tree Audit Check Form should already be set in the template file that you are using based on relationships that are set by the Region. The tree audit check form is customized for the EM template file and the ID_WM template file.



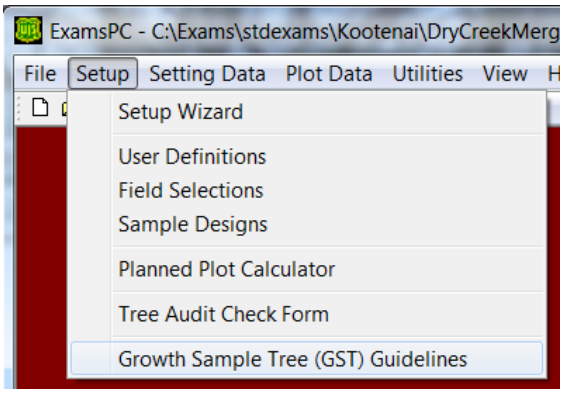
Species	Max DBH	Min Hgt	Max Hgt	C1	C2	C3	HgtTol%	Max RaG1	Max RaG2	Max HgtG	Min A
FRAXI											
FRPE	15.00		80	4.44	-6.54		30	10		10.0	
JUGLA											
JUOC											
JUOS											
JURE80											
JUSC2	18.00		35	4.19	-5.16		30	10		10.0	
LALY	25.00		110	4.76	-7.61		30	10		15.0	
LAOC											
LARIX											
MALUS											
MASY2											
OSVI											
PIAL											
PICEA											
PICO	25.00		130	4.62	-5.32		30	20		20.0	
PIEN	45.00		160	4.92	-8.30		30	20		10.0	
PIFL2	20.00		80	4.19	-5.16		30	15		10.0	
PIGL											
PIMO3											
PINUS											
PIPO	45.00		181	4.93	-9.33		30	20		15.0	
POAC5											
POAL7											
POAN3											
POBA2	25.00		100	4.44	-6.54		30	15		10.0	
POBAT											
PODE3											
POPUL											

12.2.5 Tree Audit Check Form

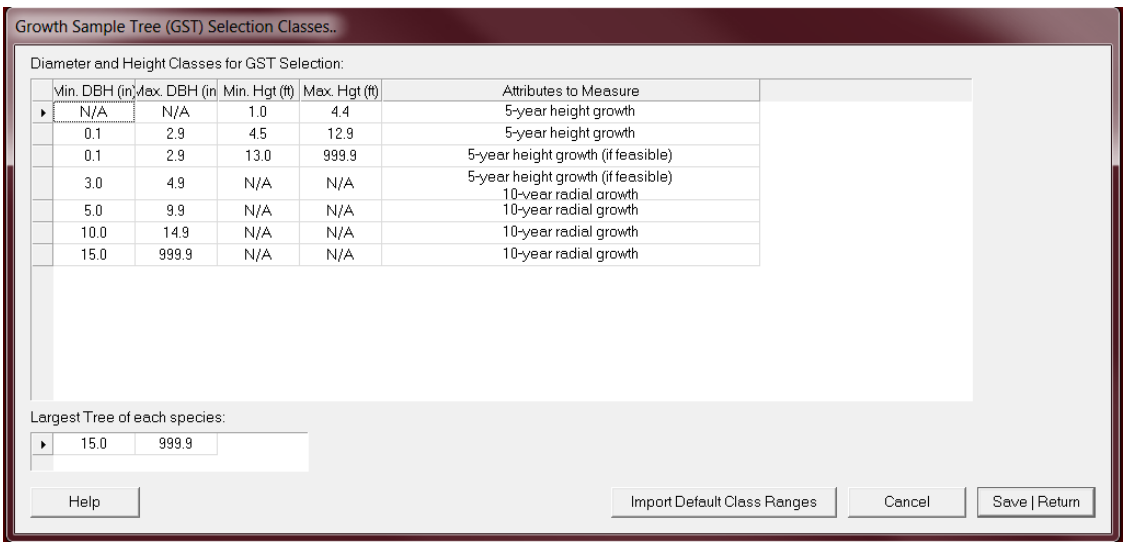
These fields can be used to set maximum heights, ages, and growth parameters for individual tree species and acceptable ranges for height/diameter relationships, however, these forms are filled out for you in the Region 1 templates. See the *National FSVeg/CSE Users Guide*, Chapter 3 for more information on the tree audit check form.

12.2.6 Growth Sample Tree (GST) Guidelines

From the Main Menu, select **Setup** and select **Growth Sample Tree (GST) Guidelines.**



The **Growth Sample Tree (GST) Guidelines** can be used to customize Growth Sample Tree diameter and height classes. Use of this function provides a systematic method for GST selection. Upon selection, the Growth Sample Tree (GST) Selection Classes window will open.



See Section **13.3.4.2 Utilizing the Automated GST Check** in this chapter for more information on setting growth sample tree (GST) selection classes**.**

12.3 Entering/Editing Data

This section describes procedures for entering/editing setting data (Section 12.3.1), sample design data (Section 12.3.2), plot data (Section 12.3.3), tree data (Section 12.3.4), vegetation composition and ground surface cover data (Section 12.3.5), and down-woody materials data (Section 12.3.5).

Use the procedures below to determine how to insert, edit, or delete data for specific forms. Data are saved to the ".cse" file that is currently open.

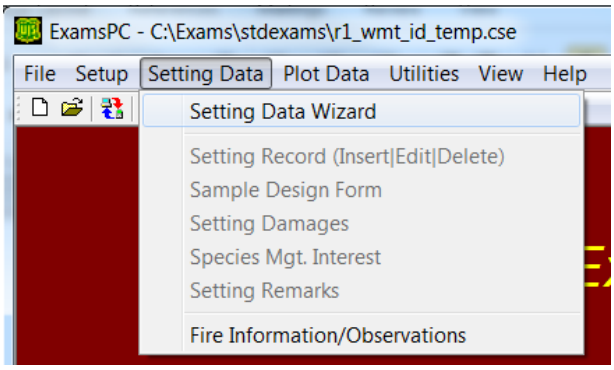
12.3.1 Entering/Editing Setting Data

Setting data can be entered/edited using either the **Setting Data Wizard** or **Insert/Edit/Delete**. These options are described below.

12.3.1.1 Using the Setting Data Wizard

From the Main Menu select "**Setting Data**," and then "**Setting Data Wizard**."

The **Setting Data Wizard** option allows you to insert new setting information or edit certain portions of existing setting information.



The buttons along the bottom of the screen have the following functions:

Button	Function
Help	Describe the column headings
Back	Inactive from this window
Next	Inactive from this window
Cancel	Delete all modifications to the data since window was opened
Save	Inactive from this window
Return	Return to the Main Menu

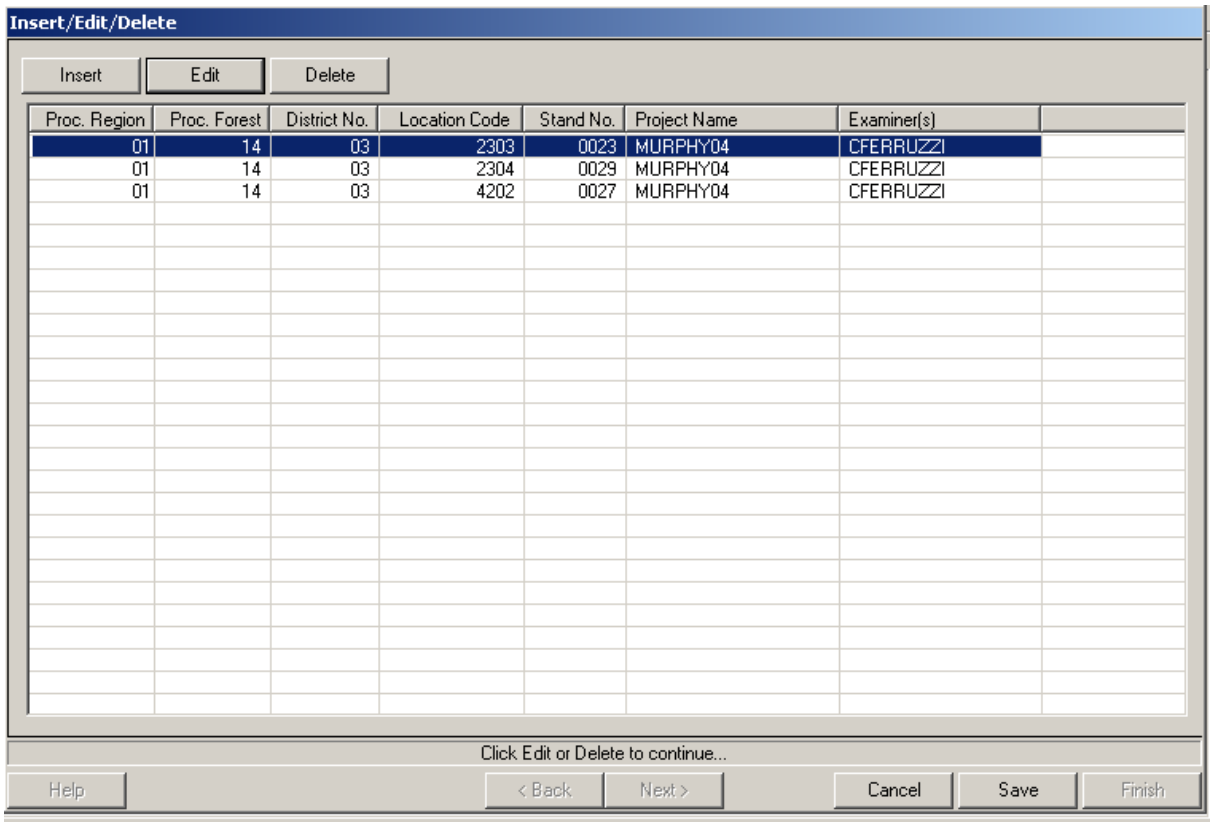
Click on the **Insert** button to open a blank Setting Form (use a new form for each setting). After the Setting Form has been completed and saved for a stand, the **Next** button can be used to display other forms related to the stand (the Sample Design Form, the Setting Damages Form, the Species of Management Interest Form, and the Setting Remarks Form). Select the saved setting, and repeatedly select the **Next** button to advance to each form.

12.3.1.2 Using Insert/Edit/Delete

From the Main Menu select "**Setting Data**," and then "**Insert/Edit/Delete**."

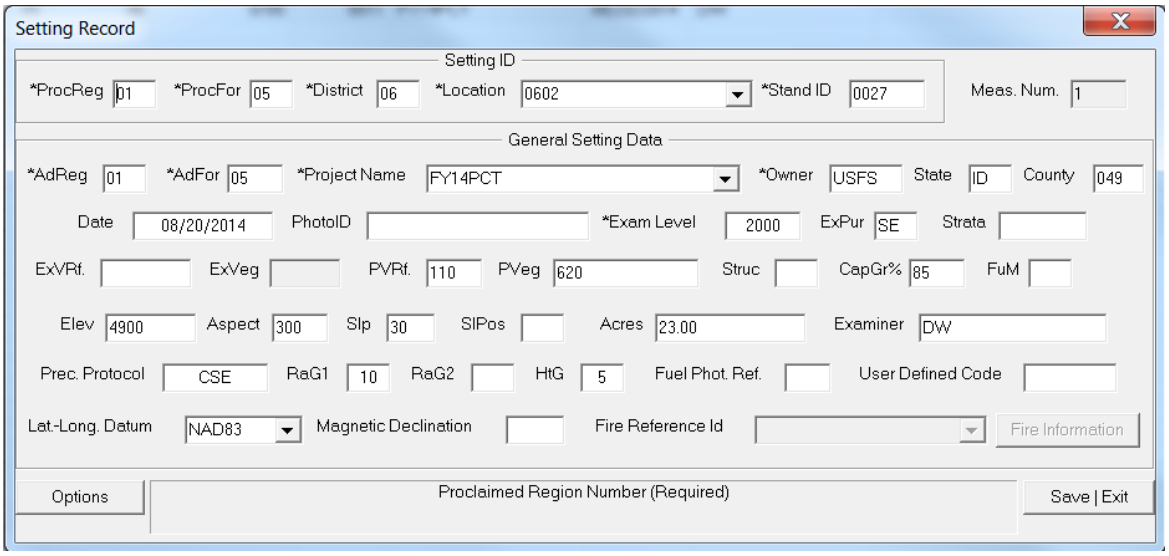
This option advances you through screens, allowing you to insert new setting data in the Setting Form, edit existing Setting Form data for a particular setting, or delete setting data records.

To enter a new setting, select the **Insert** button. To edit data for an existing setting, highlight the setting and press **Edit**. To delete a setting, and all associated data from the opened ".cse" file, select the setting and press **Delete**.



12.2.1.3 Editing the Setting Data Form

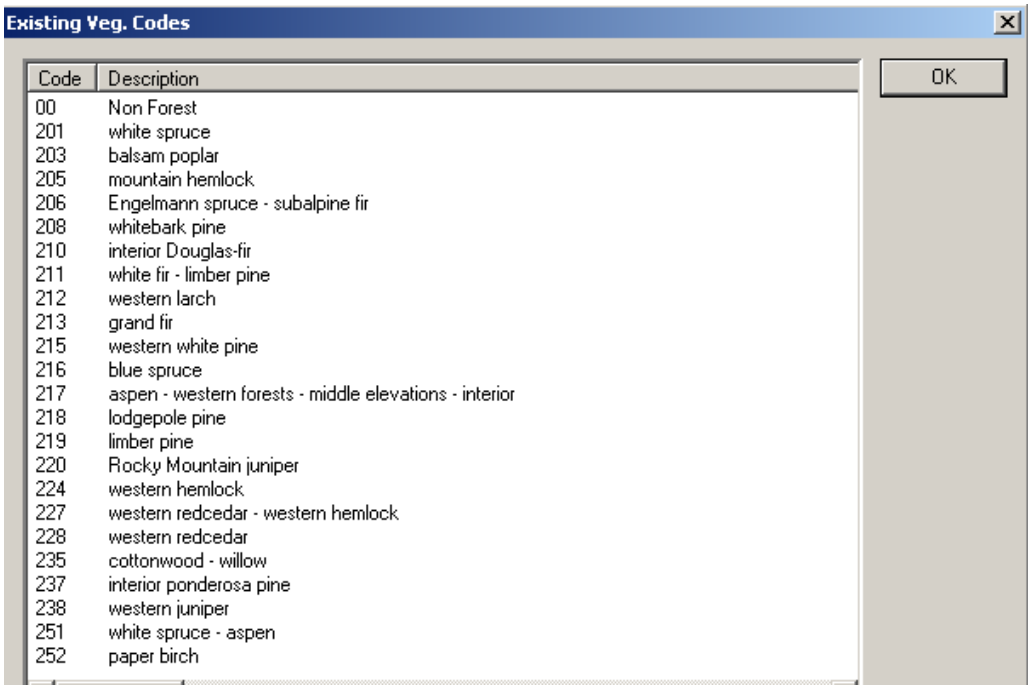
When the Setting Data Form is opened, defaults that are contained in the ".cse" file (see Section 12.2.1) are entered automatically. To move between fields, use the tab key or click on the appropriate box. Enter new data in the appropriate fields.



After you have finished entering setting data, click **Save** to return to the Insert/View form.

Entering codes from a Drop-Down List: To display a drop-down list of valid values and definitions for a particular field, place the cursor in the field, and then click on the **Options** button. Click on the desired code from the list.

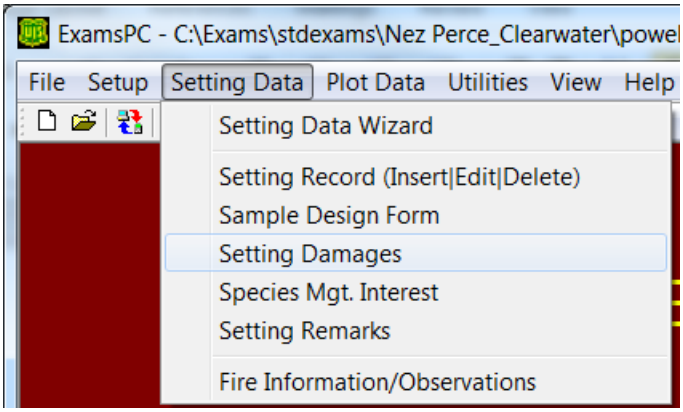
If a valid code is selected from the list, the screen will close, and the value will be entered into the field. If **X** or **OK** is selected, the form closes with no value entered into the field.



After all of the data have been entered, click the **Save** button to return to the main setting screen.

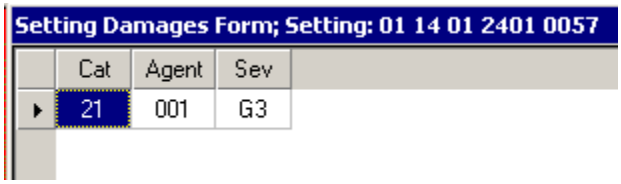
12.3.1.4 Editing the Setting Damages Form

From the Main Menu select "**Setting Data**," and then "**Setting Damages**."



A screen will appear displaying of all settings that are currently saved under the open ".cse or .im" file. To open the Setting Damages Form for an existing setting, first select the desired setting from the list, and then click the **Next** button. Note: If **Insert** is selected from this screen, a new Setting Form will be displayed.

Use the down arrow to access a new, blank line of setting damage data.



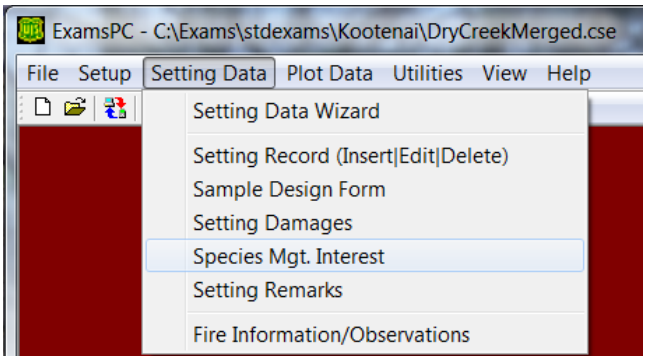
The buttons along the bottom of the screen have the following functions:

Button	Function
Help or "?"	Produce a drop-down list of valid codes and definitions for the activated field
Back	Save changes, and return to the previous screen to select a new setting
Cancel	Delete all modifications to the data since entering the form, and return to the Main Menu (a warning message is displayed)
Save	Save all changes

Button	Function
Return	Return to the Main Menu (this button is not enabled until edits have been saved)

12.3.1.5 Editing the Setting Species of Management Interest Form

From the Main Menu select "**Setting Data**," and then "**Species Mgt. Interest**."



A screen will appear displaying all settings that are currently saved under the open ".cse or .im" file. To open the Species of Management Interest Form for an existing setting, first select the desired setting from the list, and then click the **Next** button.

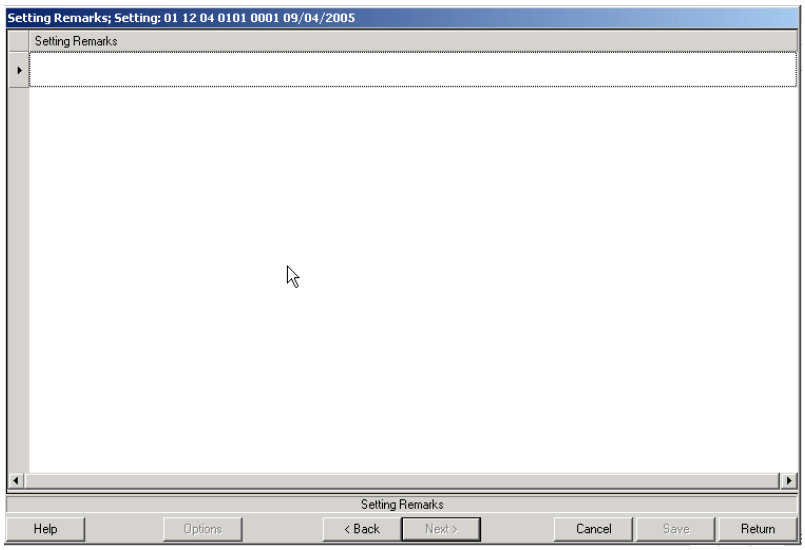
Use the down arrow to access a new, blank line of setting species of management interest. Refer to Section 12.3.1.4 for button function descriptions.

12.3.1.6 Editing the Setting Remarks Form

From the Main Menu select "**Setting Data**," and then "**Setting Remarks**."

A screen will appear displaying of all settings that are currently saved under the open ".cse" file. To open the Setting Remarks Form for an existing setting, first select the desired setting from the list, and then click the **Next** button.

Enter remarks related to the setting. All text will be converted to upper case.



Refer to Section 13.3.1.4 for button function descriptions.

12.3.1.7 Editing the Fire Information/Observations Form (IM)

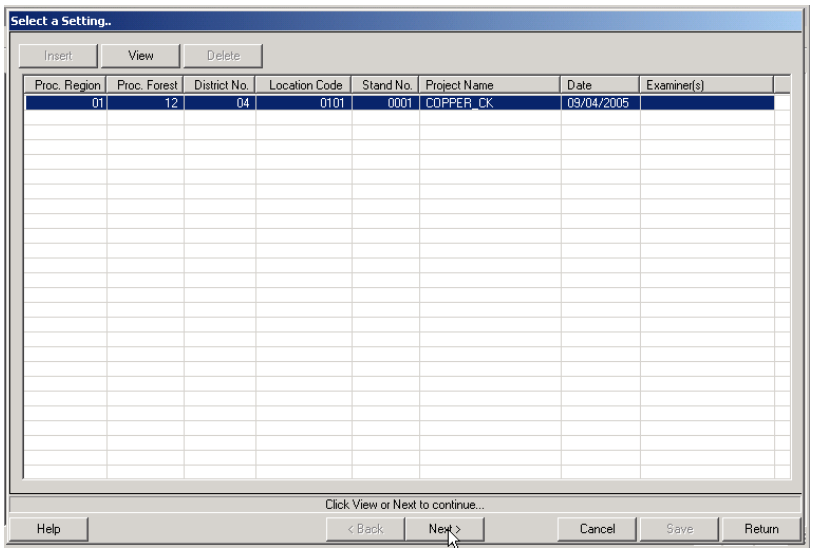
From the Main Menu select "**Setting Data**," and then "**Fire Information/Observations**." This form is used when collecting Fire and weather information associated with prescribed fires and monitoring the effects of the fire to vegetation. This selection is used to record information related to burn parameters when collecting monitoring data to assess fire effects. See R1 Supplemental Appendix R1-H for detailed information on the use of this Form.

12.3.2 Entering/Editing Sample Design Data

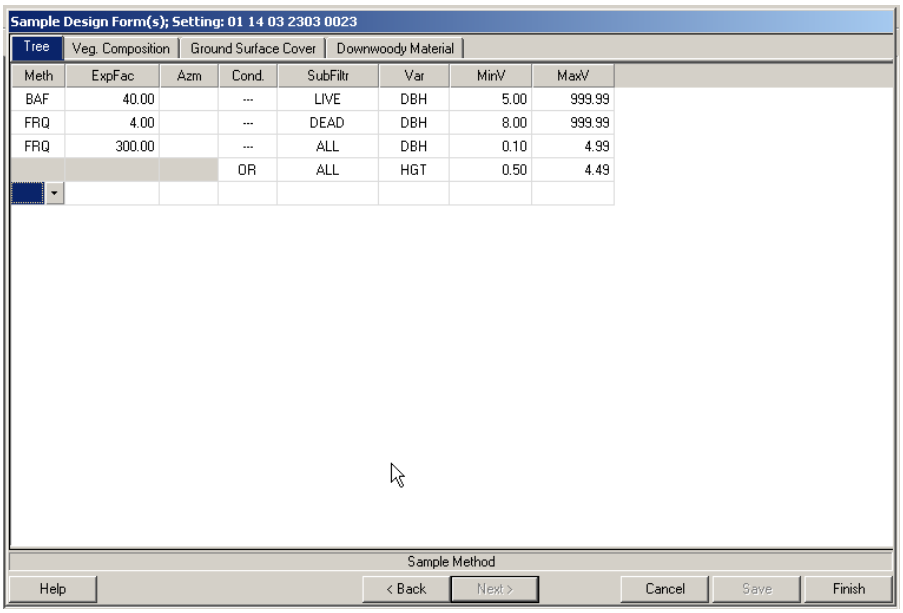
To enter/edit data for the Sample Design Form use one of the following options:

- Select "**Setting Data**" from the Main Menu, and then "**Setting Data Wizard**" – this option allows the user to create a default sample design form that will be applied to ***all*** exams collected using the current ".cse" file.

- Select "**Setting Data**" from the Main Menu, and then "**Sample Design Form**" – this option allows the user to modify the default sample design form for the ***current*** exam. If this option is used, select the desired setting (from the list), and then select **Next** at the bottom of the screen.



- Click on the appropriate tab (Tree, Veg. Composition, Ground Surface Cover, or Down-woody Material) at the top of the screen to access Sample Design data by form. Refer to the Region 1 Appendix B for a list of sample designs used in the Region.



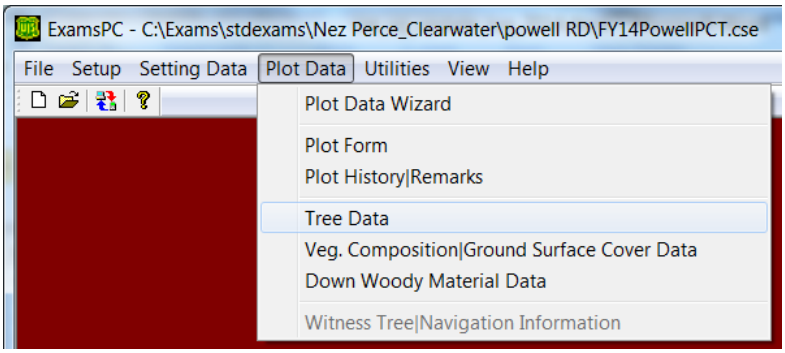
12.3.3 Entering/Editing Plot Data

To enter/edit plot data, first select "**Plot Data**" from the Main Menu, then select either "**Plot Data Wizard**," or the desired form to be edited. Procedures are described below.

12.3.3.1 Using the Plot Data Wizard

The plot data wizard cycles through the Plot Data Form (Section 12.3.3.2), Tree Data Form (Section 12.3.4.1), Vegetation Composition and Ground Surface Cover Forms

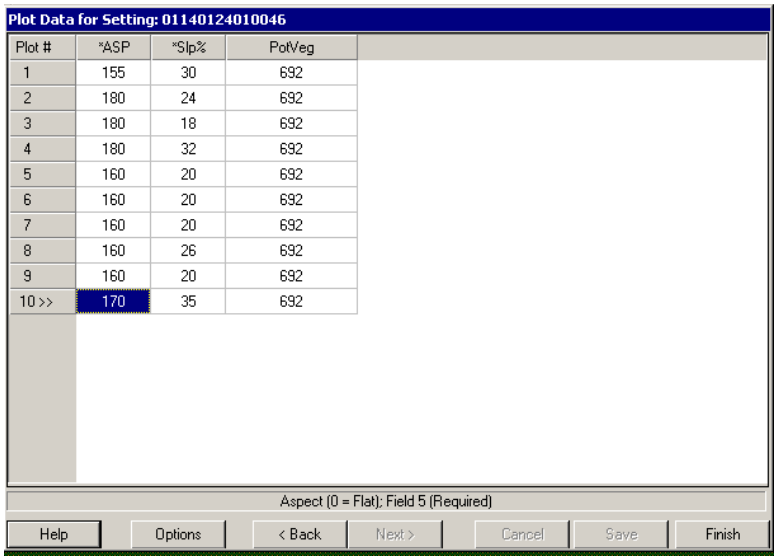
(Section 12.3.5), and Down-Woody Materials Form (Section 12.3.6) for a specific plot. The **Next** and **Back** buttons allow the user to move from one form to the next.



12.3.3.2 Editing or Entering Data with the Plot Data Form

From the Main Menu select "**Plot Data**," and then "**Plot Form**." Select the appropriate setting (from the list), and then click on the "**Next"** button at the bottom of the screen.

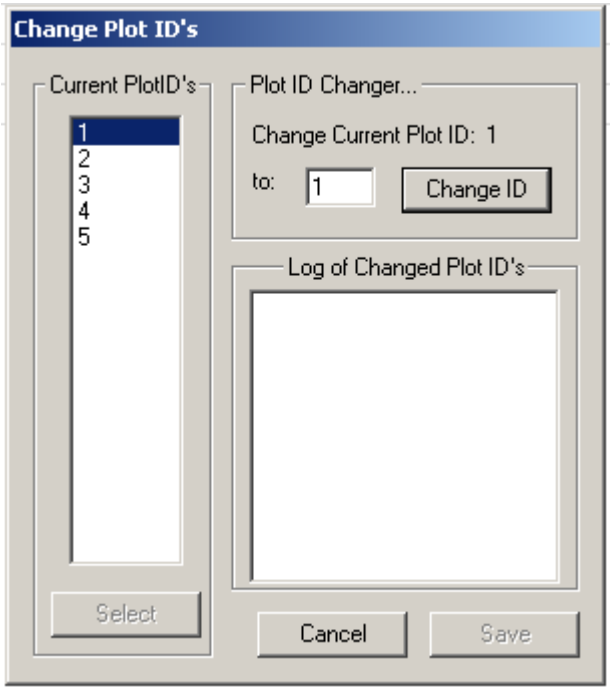
The data fields displayed on the screen will be dependent on the exam level and Regional protocol. Refer to Section 12.2.14 for information on selecting plot data fields to be displayed. Upon completion of entering plot information, Exams will automatically send you to the next data line, you must delete this line with the "delete" button to save and exit this field.



Plot #	*ASP	*Slp%	PotVeg
1	155	30	692
2	180	24	692
3	180	18	692
4	180	32	692
5	160	20	692
6	160	20	692
7	160	20	692
8	160	26	692
9	160	20	692
10 >>	170	35	692

As the down arrow descends to highlight new rows of data, the value in the Plot Number column will automatically increment by one.

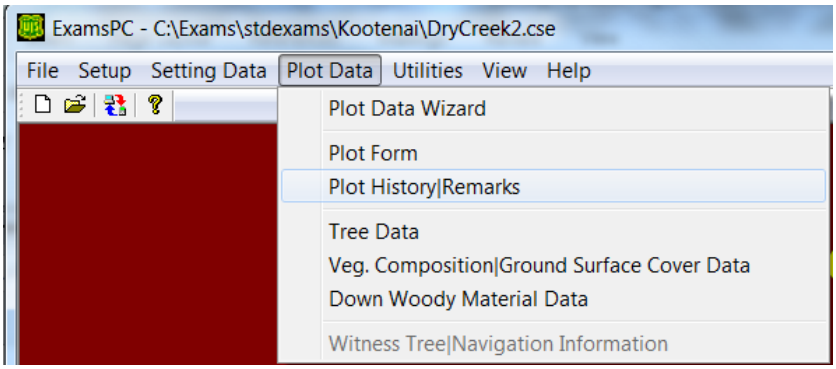
The buttons along the bottom of the **Plot Data** screen have the following functions:

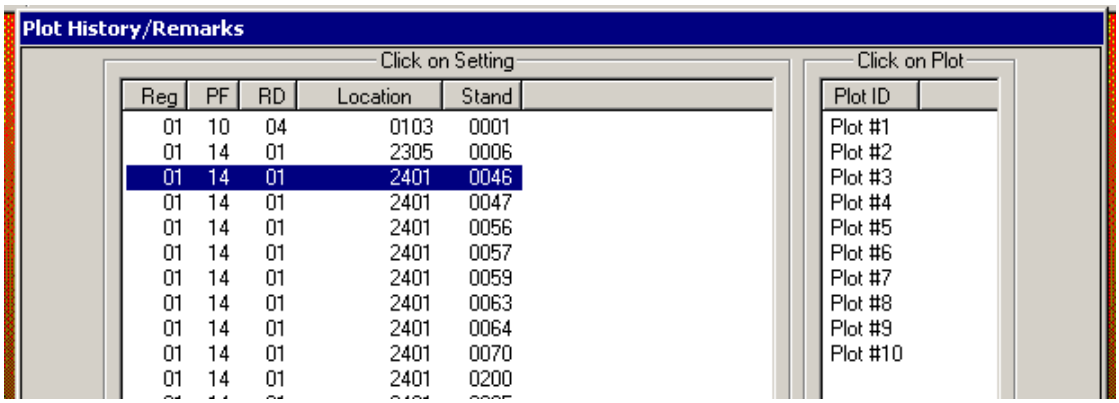
Button	Function
Help	Display information and/or a list of valid codes and definitions for the activated field.
Options: Change Plot ID's	Change Plot ID's – From the Options button select **Change Plot ID's** 
Options: Insert Plot	**Insert Plot –** Insert a plot after the last plot (the down arrow or Insert key has the same function).
Options: Delete Plot	**Delete Plot –** Delete the plot that is active (the Delete key has the same function).

Options: Sample Design by Plot	**Sample Design by Plot –** **Do not use this option!** This function will cause data to be incorrectly compiled when downloaded into FSVeg.
Options: Apply Setup:Field Selections	This field is greyed out unless changes have been made to one of the other fields in options. This selection applies any changes made.
Back	Return to Setting ID form.
Cancel	Delete all modifications to the data since the last save, and return to the Main Menu (a warning message is displayed).
Save	Save all changes, and remain in the Plot Data Form.
Return	Return to the Main Menu. This button is not enabled until all edits have been saved.

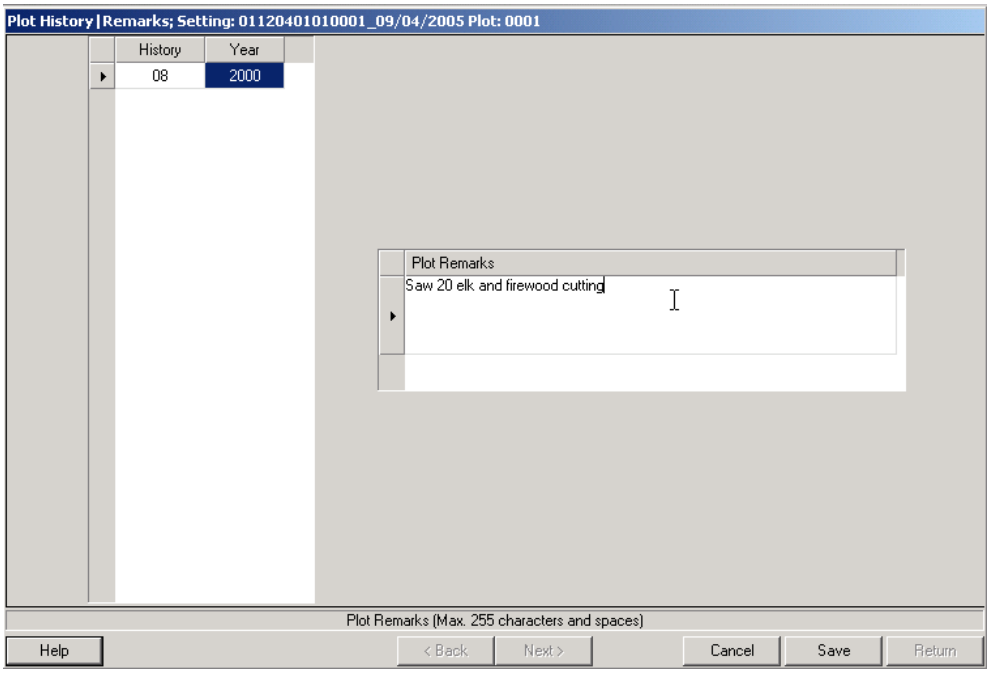
12.3.3.3 Editing Plot History and Plot Remarks

From the Main Menu select "**Plot Data**," and then "**Plot History/Remarks**." Select the appropriate Setting ID and Plot Number (from the list), and then click on the "**Next"** button at the bottom of the screen.





Enter the PLOT HISTORY code and year. Use the down arrow to access a new line of data. Enter the PLOT REMARKS (up to 255 characters).



The buttons along the bottom of the screen have the following functions:

Button	Function
Help	Display information and/or a list of valid codes and definitions for the activated field
Back	Save information, return to screen to select another setting, and return to Plot Data Form
Cancel	Delete all modifications to the data since the last save, and return to the Main Menu (a warning message is displayed)

Button	Function
Save	Save all changes, and remain in the Plot Data Form
Return	Returns to the Main Menu. This button is not enabled until all edits have been saved.

12.3.4 Entering/Editing Tree Data

12.3.4.1 Editing the Tree Data Form

From the Main Menu select "**Plot Data**," and then "**Tree Data**." Select the appropriate Setting ID and Plot Number (from the list), and then click on the "**Next"** button at the bottom of the screen.

Note: The list of settings will be limited to those that require the Tree Data Form to be collected (refer to EXAMINATION LEVEL, Item 2.13).

Tree Data; Setting: 01050118040074_07/21/2009 Plot: 0001

TagID	Species	Diam.	*T	*Cls	S	*Species	*TCnt	#DBH|DRC	#Hgt	#RaG1	#HgtG
1	LAOC	30.0	L	AC	G	LAOC	1	30.0	156.0	10	
2	ABGR	36.1	L	AC	G	ABGR	1	36.1	160.0	23	
3	PSME	23.3	L	UA	G	PSME	1	23.3	100.0	5	
4	ABGR	33.8	L	AC		ABGR	1	33.8			
5	ABGR	3.5	L	AC		ABGR	1	3.5	10.0		
6	ABGR	3.8	D	SV		ABGR	1	3.8	10.0		

To insert a new line of tree data, use the down arrow. The TAG ID NUMBER will automatically increment.

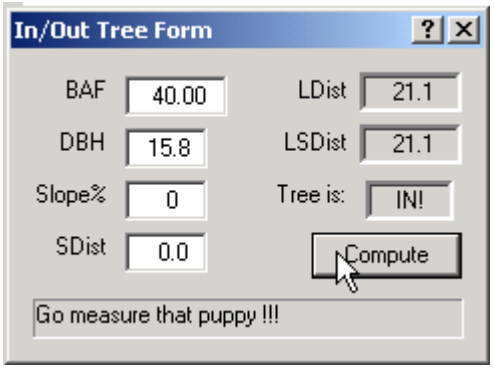
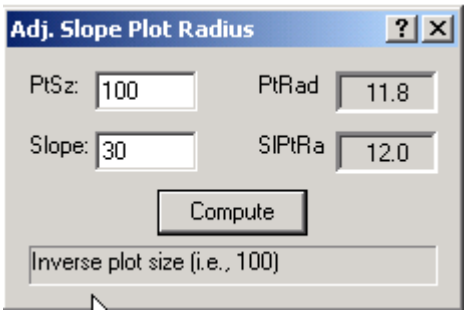
For each tree, the columns (located on the left side of the screen) for TAG ID NUMBER, SPECIES, and DIAMETER will be frozen. The other columns (located on the right side of the screen) can be scrolled to access other data fields.

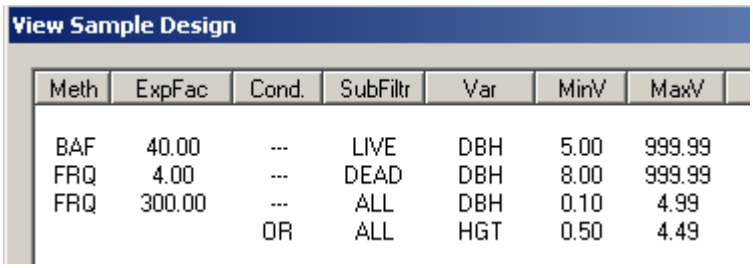
The data fields displayed on the screen will be dependent on the exam level and fields selected in the ".cse" template. Refer to Section 12.2.18 for information on selecting tree data fields to be displayed.

A down-arrow to the left of all fields will display valid codes.

The buttons along the bottom of the **Tree Data** screen have the following functions:

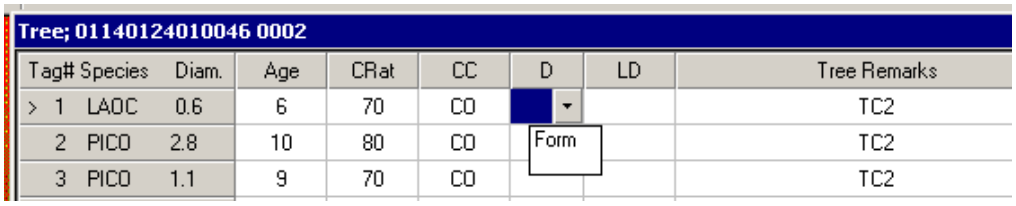
Button	Function
Help	Display valid codes and definitions for the activated field.

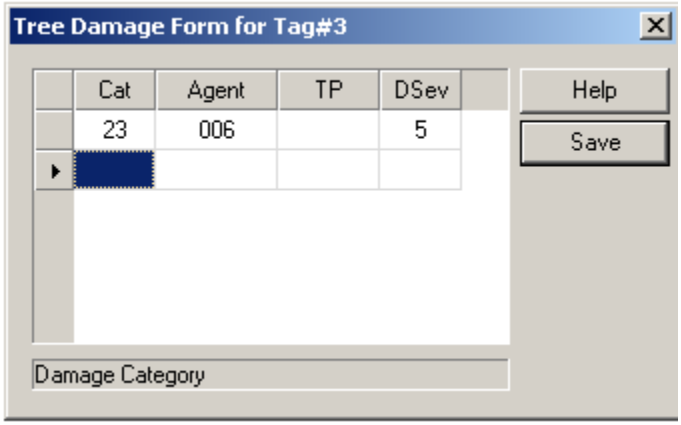
Options: In/Out	In/Out – A calculator to determine if a tree is IN or OUT on a plot (based on BAF, tree DBH, slope, and distance to the tree). 
Options: Adj. Slope Plot Radius	**Adjust Slope Plot Radius –** Calculate the radius for fixed-radius plots adjusted for slope. **Procedure:** Enter the inverse of the plot size (e.g., enter "10" for a 1/10th acre plot). Enter the slope, in percent. Select the "**Compute**" button. The computed "**PtRad**" field contains the plot radius without a slope correction, and the "**SlPtRa**" field contains the plot radius with a slope correction. 

Options: Sample Design	Sample Design – Display the Sample Design for Tree Data.  View Sample Design Meth ExpFac Cond. SubFiltr Var MinV MaxV BAF 40.00 --- LIVE DBH 5.00 999.99 FRQ 4.00 --- DEAD DBH 8.00 999.99 FRQ 300.00 --- ALL DBH 0.10 4.99 OR ALL HGT 0.50 4.49
Options: Damage Form	Damage Form – Another way to access the Tree Damage Form (to enter damages for the current tree). Use the down arrow to enter a new line of damage data.
Options: Insert Record	Insert Record – Insert a new tree record below the line where the cursor is currently positioned (the Insert key has the same function).
Options: Delete Record	Delete Record – Delete the tree record for the line where the cursor is currently positioned (the Delete key has the same function).
Back	Delete all modifications to the data since the last save, and return to the Main Menu (a warning message is displayed).
Save	Save all changes, and remain in the Tree Data Form.
Return	Return to the Main Menu (this button is not enabled until edits have been saved).

12.3.4.1.1 Editing the Tree Damage Form

Enter TREE DAMAGE codes under the field labeled “D.” This field has a drop-down menu called “Form” that will access the Tree Damage Form.



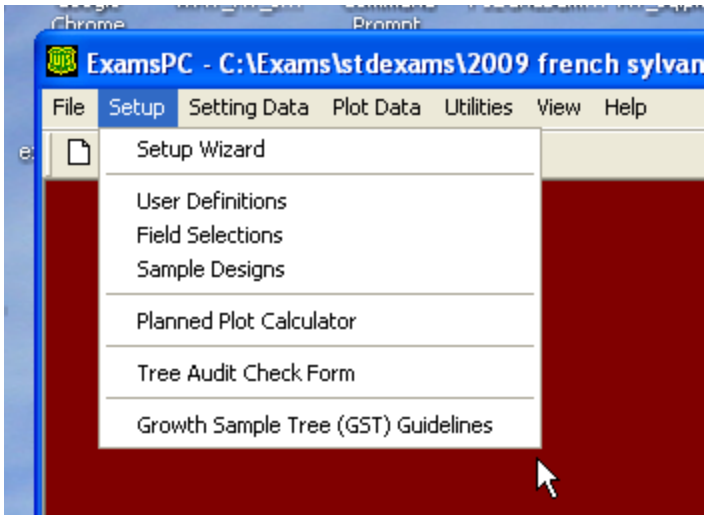


The buttons on this screen have the following functions:

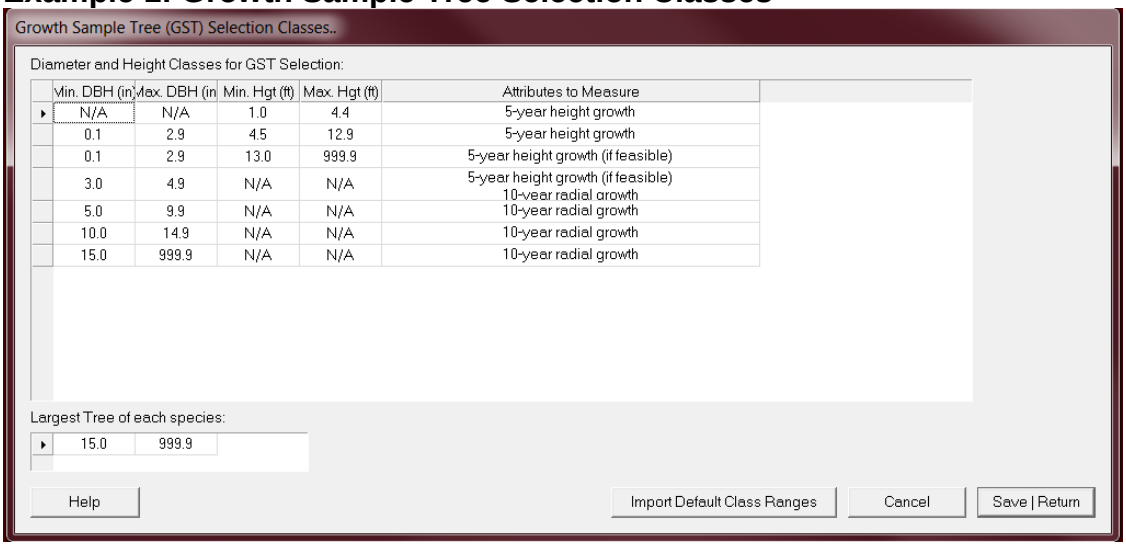
Button	Function
Help	Access the codes and descriptions for the tree damage fields
Save	Save all changes, and return to the Tree Data Form
Escape (X)	Cancel all edits, and return to the Tree Data Form

12.3.4.2 Utilizing the Automated GST Check

Exams has a feature that allows users to set up GST diameter and height classes. Once these classes have been specified, and the Check GST Tally has been enabled in the Tree Selection Form in Setup/Field Selection, Exams software will check to make sure the additional GST attributes are collected when a qualifying tree is encountered. To define the diameter/height classes, go into the Growth Sample Tree (GST) Guidelines Form through Setup.



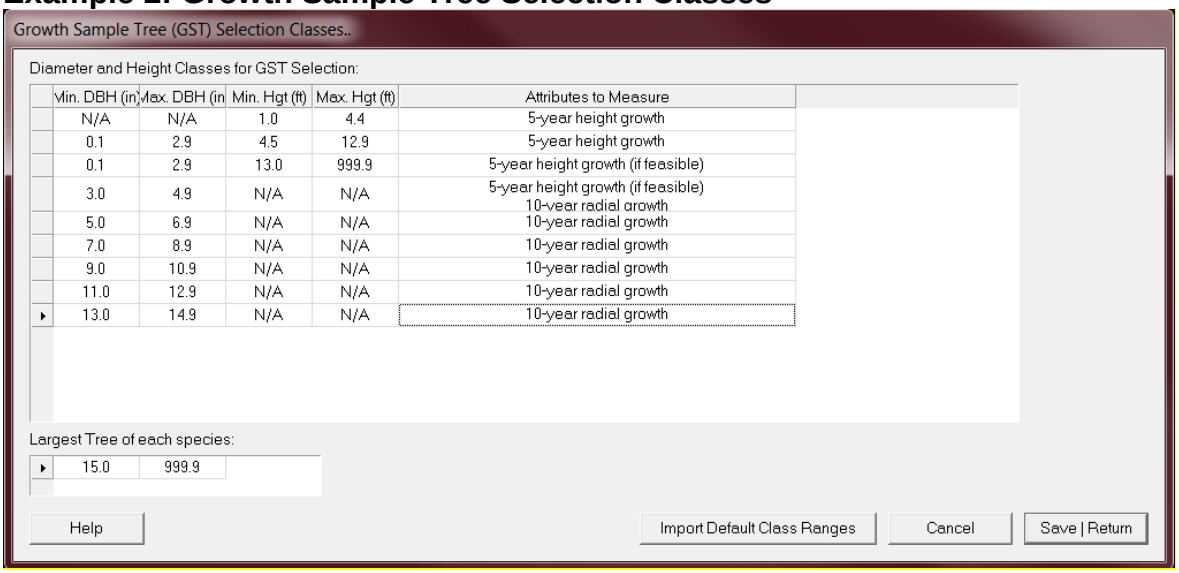
Example 1: Growth Sample Tree Selection Classes



In Example 1 above, the first live tree, of each species within each of these diameter/height classes becomes a GST tree. In addition, the largest tree of each species with a DBH greater than 15.0 encountered on the plot is a GST.

In the following example (Example 2), the first tree of each species encountered on each plot becomes a GST tree: tree with height of 1-4.4 ft tall, tree with diameter of 0.1”-2.9” DBH and height of 4.5-12.9 ft tall, trees with diameter of 0.1”-2.9” DBH and height over 13.0 ft tall, trees from 3”-4.9” DBH, trees in 2” diameter classes above 5.0”-14.9” DBH, and the largest of each tree species with trees larger than 15” DBH.

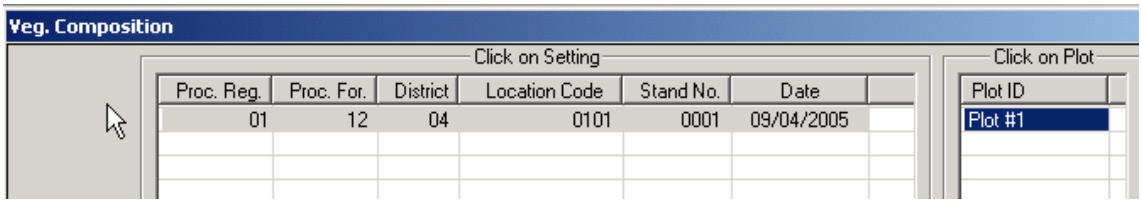
Example 2: Growth Sample Tree Selection Classes



12.3.5 Entering/Editing Vegetation Composition and Ground Surface Cover Data

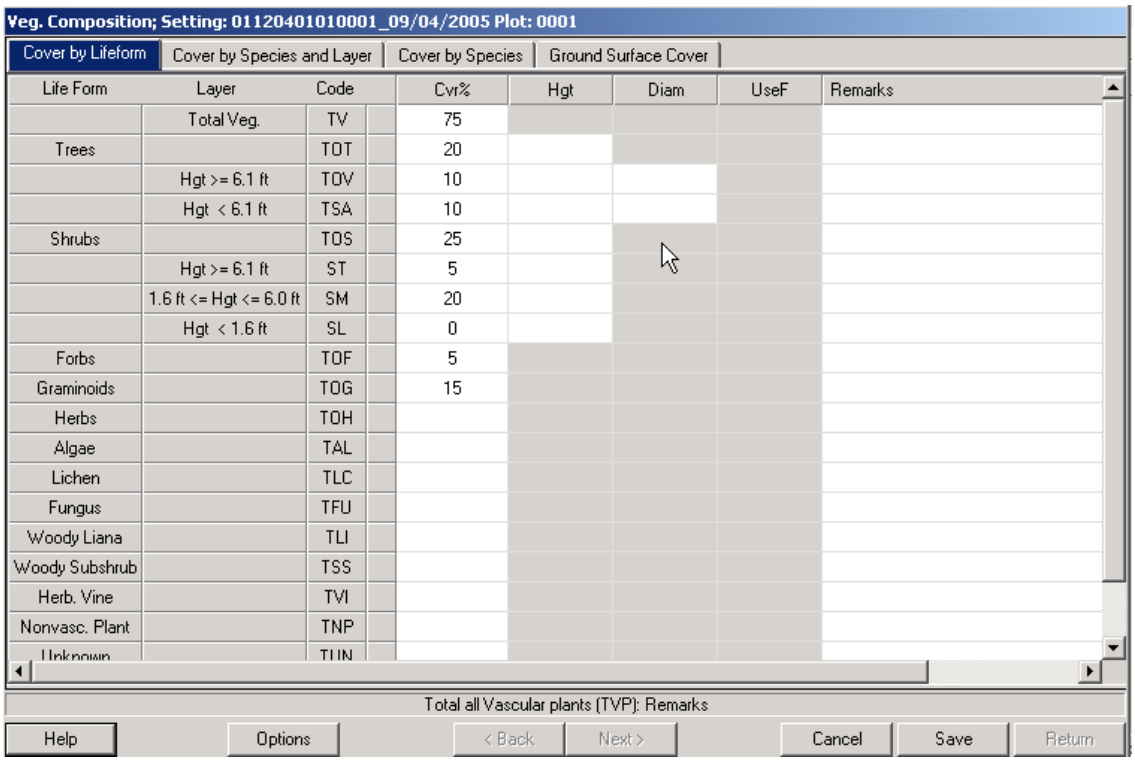
From the Main Menu select "**Plot Data**," and then "**Veg. Composition/Ground Surface Cover Data**." Select the appropriate Setting ID and Plot Number (from the list), and then click on the "**Next"** button at the bottom of the screen.

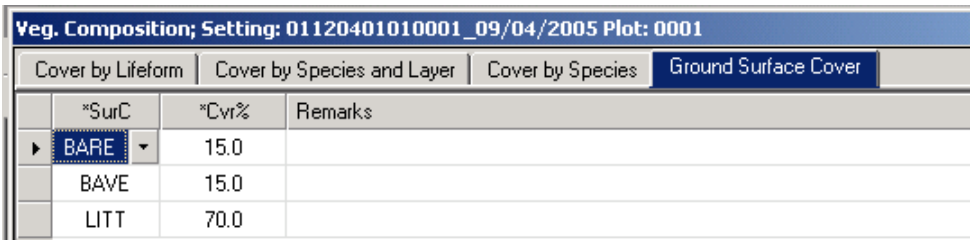
Note: The list of settings will be limited to those that require the Vegetation Composition Data and/or Ground Surface Cover Form(s) to be collected (refer to EXAMINATION LEVEL, Item 2.13).



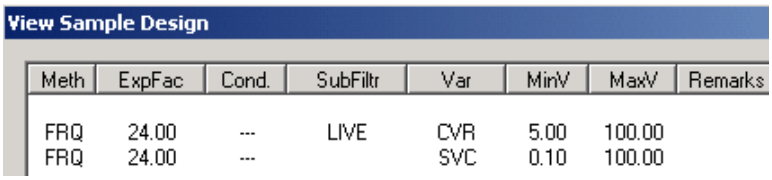
Based on the EXAMINATION LEVEL, enter the appropriate data on the specified form(s).

Click on the appropriate tab (Cover by Lifeform, Cover by Species and Layer, Cover by Species, or Ground Surface Cover) at the top of the screen to access data collection forms.





The buttons on the **Vegetation Composition** screen have the following functions:

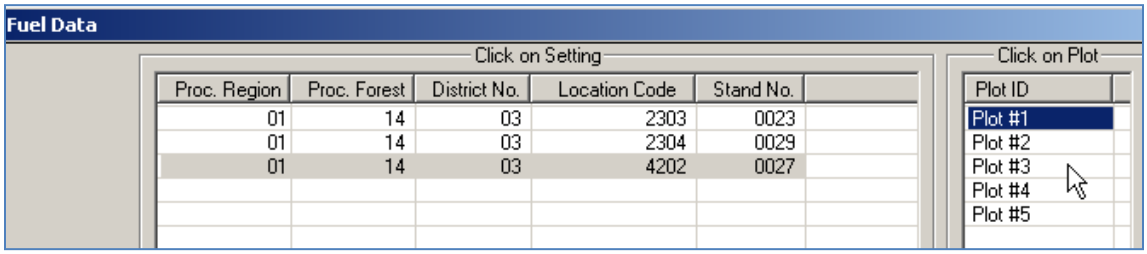
Button	Function
Help	List valid codes/descriptions for each field.
Options: Sample Design	Sample Design – Display the Sample Design for Vegetation Composition Data.  View Sample Design Meth ExpFac Cond. SubFiltr Var MinV MaxV Remarks FRQ 24.00 --- LIVE CVR 5.00 100.00 FRQ 24.00 --- SVC 0.10 100.00
Options:	Insert Record –

Insert Record	Insert a new tree record below the line where the cursor is currently positioned (the Insert key has the same function).
Options: Delete Record	Delete Record – Delete the tree record for the line where the cursor is currently positioned (the Delete key has the same function).
Back	Return to the previous screen to select another setting ID or plot number, and return to the Vegetation Composition Form.
Cancel	Cancel all changes, and return to the Main Menu (a warning message is displayed).
Save	Save all changes, and remain in the Vegetation Composition Form.
Return	Return to the Main Menu (this button is not enabled until edits have been saved).

12.3.6 Entering/Editing Down-Woody Materials Data

From the Main Menu select "**Plot Data**," and then "**Down-Woody Material Data**." Select the appropriate Setting ID and Plot Number (from the list), and then click on the "**Next"** button at the bottom of the screen.

Note: The list of settings will be limited to those that require the Down-Woody Materials Form to be collected (refer to EXAMINATION LEVEL, Item 2.13).



If the Brown's down-woody collection protocol is selected (refer to Section 12.2.23), the following data screen will appear:

Brown's Protocol – data entry screen:

Downwoody Material Data; Setting: 01140342020027 Plot: 0001

Duf1	Duf2	FuD	Twg1	Twg2	Twg3	Cnt	Dec	Diam	Len	Small	Large
1.0	0.8	3.0									
						2	3	10.0	50.0		
						2	4	10.0	50.0		

To insert a new line of data, use the down arrow. Notice that only one line of information is available for the duff and twig measurements, but many lines are available for the ≥ 3-inch diameter pieces. Also, note that until twig measurements have been entered, or a down arrow has been pressed, the data collection lines for the ≥ 3-inch diameter pieces will not be displayed.

12.3.7 Backloading Data from FSVeg into ExamsPC (IM)

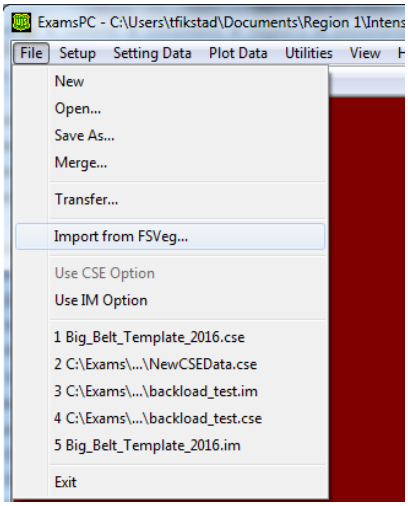
It is also possible to backload data existing in FSVeg into ExamsPC using the **Import From FSVeg** selection on the **File** dropdown menu. This function should only be used if the original data collection was Inventory and Monitoring and was intended for remeasurement over time.

When using this feature any setting, plot, tree, vegetation composition, ground surface cover, and down woody material data from the imported file will be imported from FSVeg into a new template file. The setup information included in the user definition, field selection and default sample designs will be maintained from the template the data is imported into. Follow the FSVeg data importing instructions that follow.

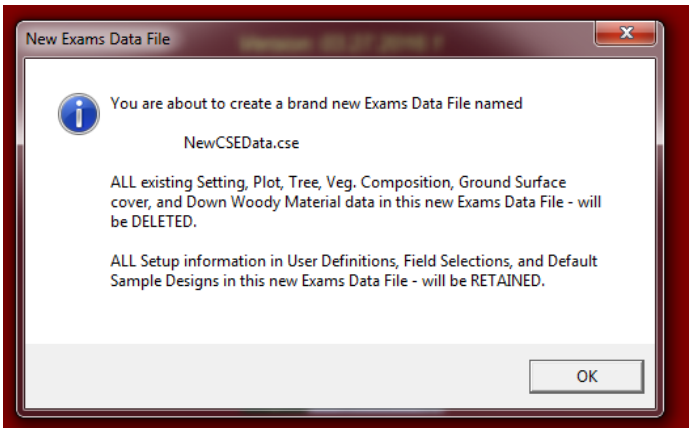
12.3.7.1 Importing Data from FSVeg Instructions

Prior to importing data into a template, customize the exams template as required. See Section 12.2 Creating a Template for step by step instructions on building a template file.

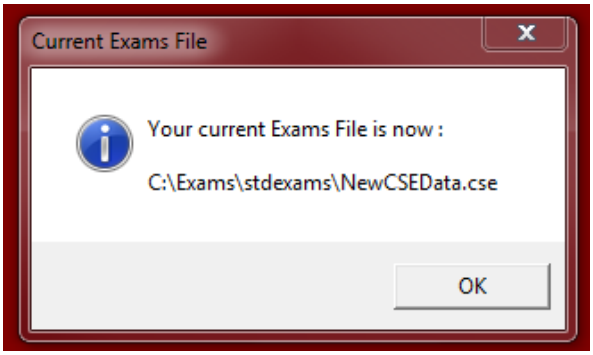
Once the template sample designs, defaults and field selections have been customized, open the template in ExamsPC. If the template used for the import is a .cse file, then only .cse files will be searchable on the import menu. Likewise, if the template is an .im file, then only .im files in FSVeg will be searchable on the import menu. Select the **Import from FSVeg** option under the **File** dropdown menu.



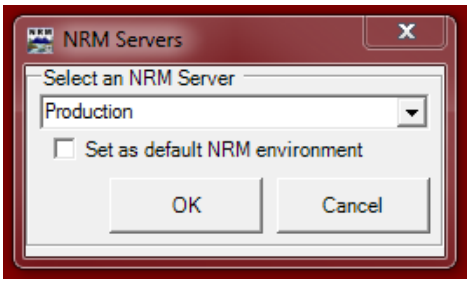
Click OK in the New Exams Data File window that pops-up.



A new Exams file named NewCSEData will be created, unless the template used is an .im file, in which case the new data file will be named NewIMData. Any field data that had been entered into the file used as the template will not be retained in the new file. If the file used as the template contained data, that file will not be deleted, however the old data will not be included in the newly created data file. Click OK in the pop-up window.

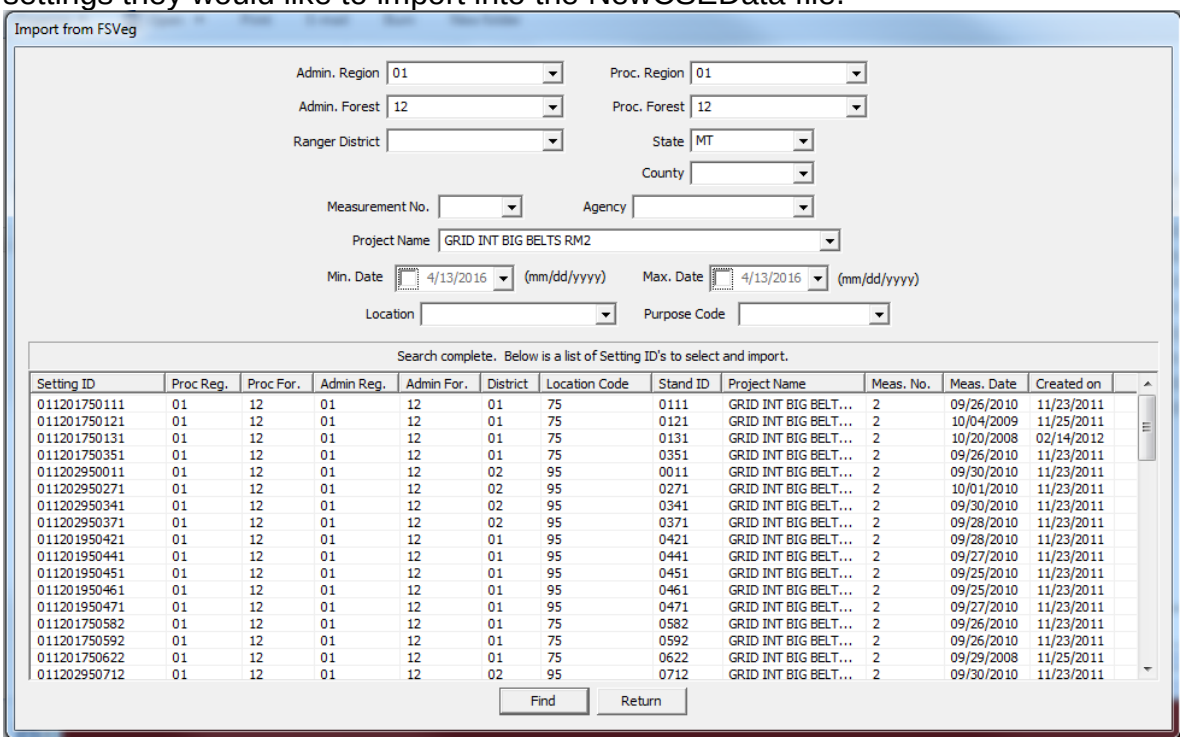


The user will have the opportunity to rename the new file before the before it is saved. The default NRM server is Production which is what you want. Click OK.



This will open the NRM Login window. Login with LincPass, or an eAuthentication ID and Password.

The Import from FSVeg window will open. This window allows the user to choose the settings they would like to import into the NewCSEData file.

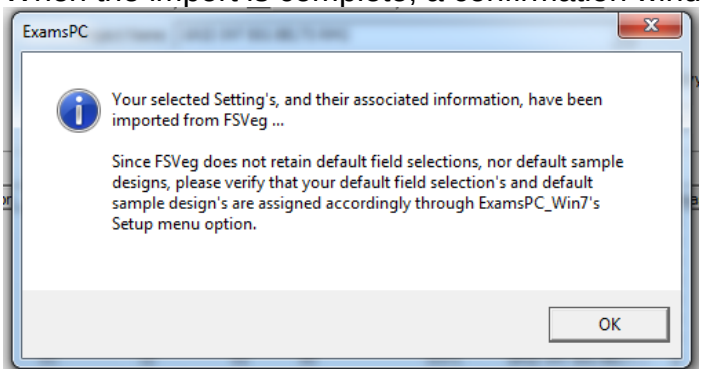


Setting ID	Proc Reg.	Proc For.	Admin Reg.	Admin For.	District	Location Code	Stand ID	Project Name	Meas. No.	Meas. Date	Created on
011201750111	01	12	01	12	01	75	0111	GRID INT BIG BELT...	2	09/26/2010	11/23/2011
011201750121	01	12	01	12	01	75	0121	GRID INT BIG BELT...	2	10/04/2009	11/25/2011
011201750131	01	12	01	12	01	75	0131	GRID INT BIG BELT...	2	10/20/2008	02/14/2012
011201750351	01	12	01	12	01	75	0351	GRID INT BIG BELT...	2	09/26/2010	11/23/2011
011202950011	01	12	01	12	02	95	0011	GRID INT BIG BELT...	2	09/30/2010	11/23/2011
011202950271	01	12	01	12	02	95	0271	GRID INT BIG BELT...	2	10/01/2010	11/23/2011
011202950341	01	12	01	12	02	95	0341	GRID INT BIG BELT...	2	09/30/2010	11/23/2011
011202950371	01	12	01	12	02	95	0371	GRID INT BIG BELT...	2	09/28/2010	11/23/2011
011201950421	01	12	01	12	01	95	0421	GRID INT BIG BELT...	2	09/28/2010	11/23/2011
011201950441	01	12	01	12	01	95	0441	GRID INT BIG BELT...	2	09/27/2010	11/23/2011
011201950451	01	12	01	12	01	95	0451	GRID INT BIG BELT...	2	09/25/2010	11/23/2011
011201950461	01	12	01	12	01	95	0461	GRID INT BIG BELT...	2	09/25/2010	11/23/2011
011201950471	01	12	01	12	01	95	0471	GRID INT BIG BELT...	2	09/27/2010	11/23/2011
011201750582	01	12	01	12	01	75	0582	GRID INT BIG BELT...	2	09/26/2010	11/23/2011
011201750592	01	12	01	12	01	75	0592	GRID INT BIG BELT...	2	09/26/2010	11/23/2011
011201750622	01	12	01	12	01	75	0622	GRID INT BIG BELT...	2	09/29/2008	11/25/2011
011202950712	01	12	01	12	02	95	0712	GRID INT BIG BELT...	2	09/30/2010	11/23/2011

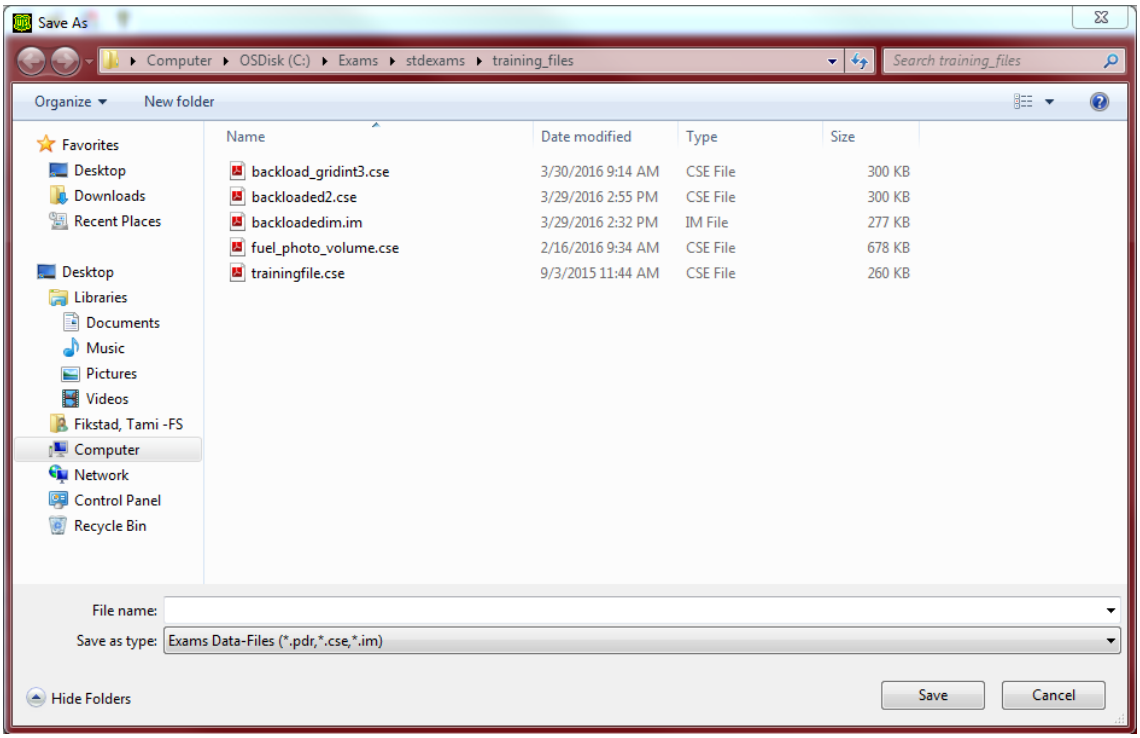
This interface is very similar to the Search Filter in FSVeg. Users can search for settings using region, forest, district, project name, state, county, location or purpose codes. Settings can also be searched using date ranges. Once the search parameters have been entered click the Find button at the bottom of the window to pull up a list of the Setting IDs that fit the search parameters entered. Clicking the Return button will cancel the search.

Select the Setting IDs of interest from the list produced by the search by highlighting them. To select multiple Setting IDs use cntl + click to select each Setting ID, or shift + click to select a range of adjacent Setting IDs. Once all of the Setting IDs of interest have been selected, click the import button to select. The importing process may take some time if importing large quantities of data. Messages will flash across the window indicating which data items are currently being imported.

When the import is complete, a confirmation window will open. Click the OK button.



You will be asked if you would like to save the new exams file with the imported data under a different name. Click **Yes** and set the name of the newly created exams file and the location where it will be saved.



Check the file to confirm that all data has been successfully imported into the new file. Delete any data items that are not needed by the remeasurement crew.

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Brown, J. K. 1974. Handbook for Inventorying Downed Woody Material. USDA Forest Service, Intermountain Forest and Range Experiment Station, General Technical Report GTR-INT-16.

Bush, Renate, M. Kirkeminde. 2017. Geospatial Interface Content: FSVeg and FSVeg Spatial. Region 1 Vegetation, Classification, Mapping, Inventory, and Analysis Report #17-3. http://fsweb.r1.fs.fed.us/forest/inv/fsveg/GI_Content_FSVeg_FSVeg_Sp.pdf

Cooper, S.V., K.E. Neiman, and D.W. Roberts 1991. Forest Habitat Types of Northern Idaho: A Second Approximation. USDA Forest Service, Intermountain Research Station. GTR-INT-236.

Kies, A. 2009. Common Stand Exam Protocols for Stocking Surveys. http://fsweb.r1.fs.fed.us/forest/inv/cse_exams/cse_template.shtml

Milburn, A., B. Bollenbacher, M. Manning, R. Bush. 2015. Region 1 Existing and Potential Vegetation Groupings used for Broad-level Analysis and Monitoring. Region 1 Vegetation, Classification, Mapping, Inventory, and Analysis Report #15-4. http://fsweb.r1.fs.fed.us/forest/inv/r1_tools/R1_allVeg_Groups.pdf

Pfister, R. D., Kovalichik, B. L., Arno, S. F., Presby, R. C. 1977. Forest Habitat Types of Montana. USDA Forest Service General Technical Report INT-34.

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R1 FSVeg Reports and Utilities User's Guide, R1 Supplement to National FSVeg/CSE User's Guide Chapters 7 and 8. Region 1 Vegetation Classification, Mapping, Inventory, and Analysis Report #17-2, 2017. http://fsweb.r1.fs.fed.us/forest/inv/fsveg/r1_fsveg_reports_and_utilities.pdf

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