

Southwest Idaho
Common Stand Exam
Field Guide
Version 1.7



Field Season 2006

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Section 1: Data Collection Procedures

The following fields are "**required**" regardless of examination level.

Setting	Project Name Region Proclaimed Forest Number District Location Stand Number Date Exam Level Precision Protocol
Design	Selection Method Expansion Factor Selection Criteria Number
Plot	Plot Number
Down Woody	Plot Number

Quick Plot – A quick plot exam may group trees by species, diameter, heights and/or damage classes on both large and small plots. These exams collect stand structural data in an efficient manner. Measurement tolerances are relaxed to allow for ocular estimation of many parameters. Diameters of live trees are estimated by DBH class and standing dead tree heights are recorded in 10 foot classes. Limited tree defect information is collected, growth data is not collected, and small tree measurements are not made other than a percentage of the understory vegetation. Cost is minimized by limiting the information gathered and reducing measurement accuracy standards.

Extensive - An extensive exam collects accurate tree measurements to tolerance standards tighter than a quick plot, but not as tight as an intensive exam. Trees on the large plot are recorded individually, but trees on the small plot may be recorded in groups. Some tree defect information is collected.

Intensive – An intensive exam collects accurate tree measurements to tight tolerance standards. It provides a comprehensive inventory for unique stands. Trees on the large plot are recorded individually, but trees on the small plot may be recorded in groups. Diameters of live trees are measured to the nearest 1/10th of an inch. Heights are measured to the nearest foot. Detailed tree defects are collected.

The following fields are required depending on the examination level.

Tree Form

Field	Quick Plot	Extensive Plot	Intensive Plot
Plot Number	X	X	X
Tag Number		X	X
Tree Status	X	X	X
Tree Class			
Site/GST Tree			X
Tree Species	X	X	X
Tree Count	X	X	X
DBH/DRC	Trees \geq 4.5 feet tall	Trees \geq 4.5 feet tall	Trees \geq 4.5 feet tall
Height	Trees < 4.5 feet tall	Trees < 4.5 feet tall	GST only and trees < 4.5 feet tall
Height to Crown			
Radial Growth			GST only
Radial Growth 2			
Height Growth			GST only
Age			GST/Site only
Crown Ratio			X
Crown Class			
Crown Width			
Damage Category		X	X
Damage Agent			X
Damage Part			
Damage Severity		X	X
Wildlife Use			
Log/Snag Decay		If Dead/Down is taken	If Dead/Down is taken
Cone Serotiny			
Number of Stems	DRC only	DRC only	DRC only
Remarks			

Vegetation Composition

Field	Quick Plot	Extensive Plot	Intensive Plot
Plot Number	X	X	X
Live/Dead			
Layer	X	X	X
Life Form	X	X	X
Species		If possible, or genus	If possible, or genus
Height Min.			X
Height Avg.	X	X	
Height Max.			X
Canopy Cover	X	X	X
Diameter Avg.			Trees only
Maturity			Shrubs only
Remarks			X

Setting

Accuracy standards are for intensive exams types. The accuracy standard is "No Errors" unless otherwise noted.

Field 1: Project Name (25-character) Required

Enter project name. Name should be consistent throughout project, which aids in database management later.

Field 2: Proclaimed Region (2-digit) Required

Use a code of "4" for Region 4.

Field 3: Proclaimed National Forest (2-digit) Required

01	Ashley	07	Dixie	14	Sawtooth
02	Boise	08	Fishlake	15	Targhee
03	Bridger	09	Humboldt	16	Teton
04	Cache	10	Manti-Lasal	17	Toiyabe
05	Caribou	12	Payette	18	Uinta
06	Challis	13	Salmon	19	Wasatch

Field 4: District (2-digit) Required

<u>Boise</u>	<u>Challis</u>	<u>Payette</u>	<u>Salmon</u>	<u>Sawtooth</u>
01 Mountain Home	01 Middle Fork	01 Council	01 Cobalt	01 Burley
03 Idaho City	02 Challis	02 Weiser	02 North Fork	02 Twin Falls
04 Cascade	03 Yankee Fork	03 New Meadows	04 Leadore	03 Ketchum
05 Lowman	04 Lost River	04 McCall	05 Salmon	04 Sawtooth NRA
06 Emette		06 Krassel		05 Fairfield

Field 5: Location (16-character) Required

Use a 6 digit code. See Site List.

Field 6: Stand Number (4-digit) Required

Use a 4 digit code. See Site List.

Field 7: Ownership (4-character) Required

Enter "USFS" for the Forest Service.

Field 8: State (2-character) Settings that cross state boundaries must be subdivided.

ID	Idaho	NV	Nevada
UT	Utah	WY	Wyoming

Field 9: County (3-digit)

Idaho

001 Ada	023 Butte	045 Gem	067 Minidoka
003 Adams	025 Camas	047 Gooding	069 Nez Perce
005 Bannock	027 Canyon	049 Idaho	071 Oneida
007 Bear Lake	029 Caribou	051 Jefferson	073 Owyhee
009 Benewah	031 Cassia	053 Jerome	075 Payette
011 Bingham	033 Clark	055 Kootenai	077 Power

013 Blaine	035 Clearwater	057 Latah	079 Shoshone
015 Boise	037 Custer	059 Lemhi	081 Teton
017 Bonner	039 Elmore	061 Lewis	083 Twin Falls
019 Bonneville	041 Franklin	063 Lincoln	085 Valley
021 Boundary	043 Fremont	065 Madison	087 Washington

Field 10: Administrative Region (2-digit)

Record the appropriate Administrative Region code. See Proclaimed Region for codes.

Field 11: Administrative Forest (2-digit)

01	Ashley	10	Manti-Lasal
02	Boise	12	Payette
03	Bridger - Teton	13	Salmon
05	Caribou	14	Sawtooth
06	Challis	15	Targhee
07	Dixie	17	Toiyabe
08	Fishlake	18	Uinta
09	Humboldt	19	Wasatch - Cache

Field 12: Date (8-digit) Required

Record the calendar month, day, and year the stand examination was completed. (MMDDYYYY)

Field 13: Photo ID (14-character)

Record the Photo ID of the aerial photo where the majority of the setting is located.

- First six numbers represent Photo Symbol/Project ID
- Second four numbers represent the roll number
- Last four numbers represent the exposure number

Field 14: Examination Level (4-digit)

Record the examination level that identifies the scope and range of information being collected. The range of data collected on each form is one of the following:

Tree

<u>Code</u>	<u>Description</u>
0	This form was not used
1	Quick Plot
2	Extensive examination
3	Intensive examination

Vegetation Composition

For the Vegetation Composition, record one of the following:

Code	Interested in Obtaining	Species to record	Subpop. Min.	Subpop. Max.	Form 1	Form 2	Form 3	Form 4
1	Quick estimate	Life form only	1%	100	Required	Optional	Optional	Optional
2	TES, NOX,	Only specific	User	100	Required	Required	Optional	Optional

	and/or the dominant four species	species	defined					
3	All species	All species to a specified %	User defined	100	Required	Required	Optional	Optional
4	All species, including TES and NOX to trace	All species to a specified %, but species on a list to trace	User defined	100	Required	Required	Optional	Optional

Down Woody

For the Down Woody data, record one of the following:

Code	Description
0	This form was not used.
1	Data was collected, but not according to Brown's Protocol.
2	Data was collected according to Brown's Protocol.

Field 15: Exam Purpose (2-character)

Use one of the following codes to define the purpose of the exam. Most stand examinations will use the code "SE."

- FI** Forest Inventory
- RE** Regeneration/Stocking Surveys
- TH** Thinning Exam (certify thinning prescription accomplishment)
- ID** Insect & Disease Exams
- TI** Tree Improvement
- SE** Stand Exam

Field 16: Stratum (6-character)

Record the current setting stratum. Refer to aerial photo typing or other stratification information done in conjunction with the examination

Field 17: Existing Vegetation Composition Reference

Record the dominant existing vegetation references. Only one existing vegetation reference code may be selected per examination. Refer to Appendix E.

Field 18: Existing Vegetation Composition Type (8-character)

Record the dominant existing vegetation composition code based on plot observations. Refer to Appendix E.

Field 19: Potential Vegetation Reference (3-character)

Record the potential vegetation reference code for the potential vegetation code used in field 18. Only one potential vegetation reference code may be selected per examination.

Code

401 Forest habitat types of Cental Idaho. Gen. Tech. Rep. INT-114.

Field 20: Potential Vegetation (8-digit)

Record the predominant potential vegetation code for the setting. If the setting is evenly split between two habitat types, select the drier type. See Appendix G for a complete list of Potential Vegetation codes.

Field 21: Structure (2-character)

(SS) Single-story - A single even canopy characterizes the stand. The greatest number of trees are in a height class represented by the average height of the stand; there are substantially fewer trees in height classes above and below this mean. Tree layers should comprise at least 15% cover to be considered an independent layer.

(TS) Two-storied - Two relatively even canopy levels can be recognized in the stand. The frequency distribution of trees by height 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 uniformly distributed across the stand (e.g., overstory with regenerated understory). Tree layers should comprise at least 15% cover to be considered an independent canopy level.

(MS) Multi-storied - At least three height size classes are commonly represented in the stand. Generally, the canopy is broken and uneven although multiple canopy levels may be distinguishable. The various size classes tend to be uniformly distributed throughout the stand.

(MO) Mosaic - At least two distinct height size classes are represented and these are not uniformly distributed, but are grouped in small repeating aggregations, or occur as stringers less than two chains wide, throughout the stand. Each size class aggregation is too small to be recognized and mapped as an individual stand.

(UA) Unknown – stand did not fit into one of the pre-defined categories.

Field 22: Capable Growing Area (3-digit)

Estimate the percent of the setting area capable of supporting trees. Deduct areas such as roads, creeks, swamps, rock outcrops, etc. For example, if an area contains 5% rock outcropping and 10% road, record a capable growing area of 85%. Accuracy Standard is ± 10 percent.

Field 23: Fuel Model (2-digit)

Record the predominant setting fuel model determined by the plurality of sample plot fuel model codes.

Code	Description
Grass and Grass Dominated areas	
1	Short Grass (1 foot)
2	Timber (grass and under story)
3	Tall Grass (2.5 feet)
Chaparral and Shrub areas	
4	Chaparral (6 feet)
5	Brush (2 feet)
6	Dormant brush, Hardwood slash
7	Southern Rough
Timber Litter	
8	Closed timber litter
9	Hardwood litter
10	Timber (litter and under story)
Slash	
11	Light logging slash
12	Medium logging slash
13	Heavy logging slash

Field 24: Elevation (5-digit)

Record the median setting elevation, in feet. Accuracy Standard is ± 2 contour intervals.

Field 25: Aspect (3-digit)

Record the predominant setting aspect in degrees, 0° to 360° . Setting aspect is the general direction toward which the setting faces. Stand aspect may be determined from contour maps or by taking compass readings directly down slope at various places within the setting. Accuracy Standard: ± 45 degrees.

- 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.

0	Flat
360	360°
999	Indeterminate/No predominant aspect/Undulating

Field 26: Slope (3-digit)

Record the average slope for the stand, in percent. Accuracy Standard is ± 10 percent.

Field 27: Slope Position (2-character)

Record the position of the setting on the landscape. See Field 7 under Plot Data for definitions. Accuracy standard is ± 1 class.

SU **Summit/Ridgetop/Plateau.**
SH **Shoulder.**
BS **Backslope.**
FS **Footslope**
TS **Toeslope**
VB **Valley Bottom.**

Field 28: Acres (4-digit)

Record the stand acres. See Site List.

Field 29: Radial Growth Interval (2-digit)

Record the time period used for measuring radial growth.

Code

10 10 years.

Field 30: Height Growth Interval (2-digit)

Record the time period associated with the height growth measurements.

Code

5 5 years.

Field 31: Fuel Photo Reference (3-digit)

Record the fuel photo reference code for the photos to be used for this Setting. Only one reference (source/book) may be used per Setting. Selection is generally based on timber or habitat type.

Field 32: Precision Protocol (6-character)

Record the precision protocol used. Record the precision protocol used in data collection. The default precision protocol “CSE” follows the CSE guidelines specified in this document for intensive exams. “CSE_E” is for Extensive exams; “CSE_Q” is for Quick Plot exams. Refer to the CSE User Guide for details on the Precision Protocols.

Field 33: Damage Category (2-digit)

Record damage seen within the setting that was not recorded as tree damages or plot history. See Appendix R for a complete list of damage category codes. Accuracy Standard: No Errors if found in stand along transect and not represented in tree damage or plot history.

Field 34: Damage Agent (3-digit)

Record the damage agent. See Appendix R for a complete list of all damage agent codes. Record if found in setting along transect and not represented in tree damage or plot history.

Field 35: Damage Severity (2-character)

Record the damage severity. See Appendix R for a complete list of all damage severity codes. Use the setting severity codes where indicated in Appendix R. Record if found in setting and not represented in tree damage.

Field 36: Species of Management Interest (8-character)

Record plant species of management interest that occur in the setting, but do not occur on any of the plots. Species of management interest may include noxious weeds, threatened, endangered, or sensitive plants, or management indicator species. Multiple species codes may be entered. Note the approximate location of these species in the stand sketch notes. See Appendix H for a complete list of noxious weeds, threatened, endangered, and sensitive plants. This is only an indication of the presence of a species of management interest.

Field 37: Sketch Map And Traverse Notes

Make a sketch of the setting showing the relative location of the plots. Record azimuth and distance for each transect. Include a North arrow and other notable features such as roads, trails, lakes, and creeks that will assist in relocating the plots. Also note the location of special features, such as cliffs, wallows, rock outcrops, landslides, springs or seeps, caves, and large bird nests.

Field 38: Examiner (12-character) *Required*

Record the individual(s) responsible for data collection. When using a Portable Data recorder, do not use reserved characters such as +, /, -, or * in this field.

Field 39: Setting Remarks (242-character)

Record remarks about setting conditions. Include comments on overall health of stand, species and size class distribution, exposed rock, wildlife observations, regeneration, minor habitat types, etc.

Sample Design

Complete one Sample Design Form for each setting. The accuracy standard is "No Errors" unless otherwise noted.

A sample form will be included in the contract. Use that as an example to follow.

Field 1: Sample Selection Method Type (3-character) Required

Record the method by which trees, shrubs, grasses, or down woody material were selected.

FRQ	Frequency for fixed area plots or linear strip plots.
BAF	Basal area factor for a horizontal plot sample.
TRN	Fixed length transect line, to the nearest foot.

Field 2: Sample Expansion Factor (6,1- digit) Required

This field corresponds to the Sample Selection Method Type, and converts tree or piece data to a per-unit-area basis.

Field 2	Code	Description
FRQ	20	The inverse of a 1/20 th acre plot or strip area
FRQ	3	The inverse of a 1/3 rd acre plot or strip area
FRQ	.2	The inverse of a 5 acre plot or strip area
BAF	40	40 basal area factor
TRN	27	The horizontal length of a transect line to the nearest foot.

Field 3: Starting Azimuth (3-digit)

Record the starting azimuth for transect lines (where selection method type is "TRN").

Field 4: Subpopulation Filter (8-character)

Record the filter used to define the subpopulation. Use the following codes:

LIVE	Live standing
DEAD	Dead standing
ALL	Both live and dead standing
STUMPS	Stumps
DOWN	Down logs

Field 5: Selection Criteria Number (2-digit) Required

Record a sequential number, starting with "1," for each line of data within a sample selection method. Do not reuse a number between sample selection methods. Vegetation must meet **one** of the sequentially numbered criteria in order to be sampled on the plot type. If two or more lines have the **same number**, they are considered a "set," and vegetation must meet **all** the criteria in the set in order to be sampled by that selection method.

Example 1: On a variable radius plot, sample all live and dead trees which are **either** greater than 5.0 inches DBH **or** are greater than 3.0 inches DRC. This requires **two** different selection criteria numbers:

Form Type	Sample Selection Method	Sample Expansion Factor	Subpop. Filter	Selection Criteria Number	Subpop. Variable	Subpop. Minimum Value	Subpop. Maximum Value
TREE	BAF	20	ALL	1	DBH	5.0	999.9
				2	DRC	3.0	999.9

Example 2: On a 27-foot transect, sample down woody pieces that are greater than 12 inches at the intersection diameter **AND** are at least six feet long. This requires the **SAME** selection criteria number. This implies that **both** intersection diameter **and** piece length must be recorded in order for a piece of vegetation to meet these two criteria.

Form Type	Sample Selection Method	Sample Expansion Factor	Subpop. Filter	Selection Criteria Number	Subpop. Variable	Subpop. Minimum Value	Subpop. Maximum Value
DNWDY	TRN	27	DOWN	1	DIA	12.0	999.9
				1	LGT	6	999.9

Example 3: If both of the above selection parameters were placed on the same sample design form it would look like the following:

Form Type	Sample Selection Method	Sample Expansion Factor	Subpop. Filter	Selection Criteria Number	Subpop. Variable	Subpop. Minimum Value	Subpop. Maximum Value
TREE	BAF	20	ALL	1	DBH	5.0	999.9
				2	DRC	3.0	999.9
DNWDY	TRN	27	DOWN	3	DIA	12.0	999.9
				3	LGT	6	999.9

The first two lines have **different** selection criteria numbers, hence a piece of vegetation would have to meet **either** one of the criteria to be sampled on the variable radius plot. The next two lines have the **same** selection criteria numbers, hence a piece of vegetation would have to meet **both** of the criteria to be sampled on the transect. This implies that **both** intersection diameter **and** piece length must be recorded in order for a piece of vegetation to meet these two criteria.

Field 6: Subpopulation Variable (3-character)

Record the characteristic used to define the subpopulations sampled.

DBH	Diameter at Breast Height
DRC	Diameter at Root Collar
HGT	Height
CVR	Percent Vegetation Species Cover
SVC	Percent Ground Surface Cover
LGT	Length
DIA	Diameter at Midpoint or Intersection
DMG	Tree Damage Category
SPP	Species

Field 7: Subpopulation Minimum Value (4,1- digit)

Record the minimum value for the subpopulation variables. Default is 0.

Field 8: Subpopulation Maximum Value (4,1- digit)

Record the maximum value for the subpopulation variables. Default is 999.9.

Field 9: Sample Design Remarks (242-character)

Record information to explain the sample design used.

Plot Data

Record separate sets of plot data for each plot in the stand. The accuracy standard is "No Errors" unless otherwise noted.

Field 1: Plot Number (3-digit) *Required*

Record plot number for each plot. Plots do not have to be numbered consecutively, but the number of plots must equal the number entered on the Sample Design Form.

Field 2: Plot Latitude (8-digit)

Record the plot latitude as measured by a Global Positioning System (GPS). Latitude consists of a 3-digit "degree", a 2-digit "minute", and a 3-digit "second" value.

Field 3: Plot Longitude (8-digit)

Record the plot longitude as measured by a Global Positioning System (GPS). Longitude consists of a 3-digit "degree", a 2-digit "minute", and a 3-digit "second" value.

Field 4: Capable Growing Area Percent (3-digit)

Record an estimate of the percent of the plot capable of supporting trees. Exclude areas such as roads, creeks, swamps, rock outcrops, etc. Use the fixed plot size for estimating the capable growing area percent. A plot not capable of supporting trees would be coded as 0. Accuracy Standard is ± 10 percent

Field 5: Plot Aspect (3-digit)

Record the direction, in degrees true North, which the plot faces. Aspect may be determined by taking compass readings directly downslope from plot center.

- If aspect changes gradually across the plot, record an average aspect.
- If aspect changes across the plot but is predominately of one direction, code predominate aspect, rather than the average.
- If the plot falls on or straddles a canyon bottom or narrow ridge top, code the aspect of the ridgeline or canyon bottom.
- If the plot 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.
- Use a code of zero for flat
- Use a code of 999 for indeterminate, nor predominant aspect, or undulating

Accuracy Standard is $\pm 45^\circ$

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

Field 6: Plot Slope (3-digit)

Record the slope, in percent. Average the downslope and upslope measurements from plot center. Slope is defined as the ratio of vertical rise divided by the horizontal distance.

- If slope changes gradually across the plot, record an average slope.
- If slope changes across the plot but the slope is predominately of one direction, code predominate slope percentage rather than the average.
- If the slope falls directly between two side hills, code the average slope of the side hill(s).

If the slope 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.

Accuracy Standard is ± 10 percent.

Field 7: Slope Position (2-character)

Record the plot position on the landscape. Accuracy Standard is ± 1 Class.

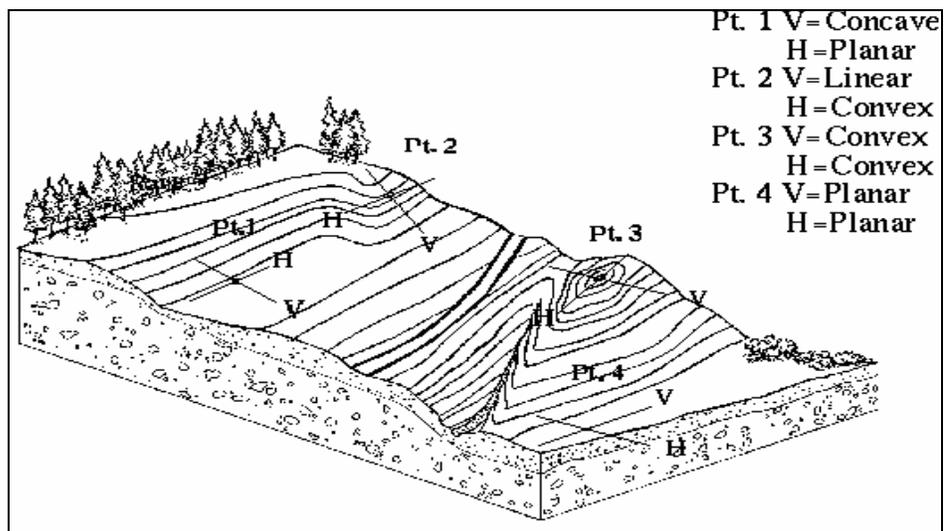
- SU **Summit/Ridgetop/Plateau.**
- SH **Shoulder**
- BS **Backslope**
- FS **Footslope**
- TS **Toeslop**
- VB **Valley Bottom**

Field 8: Slope Horizontal Shape (2-character)

Record the micro-site horizontal shape of the plot. The horizontal shape is oriented across the slope, perpendicular to the vertical shape, or roughly parallel to the contours of the landforms. It goes from side-slope to side-slope. Use 1/10th acre plot for ocular estimate. Valid codes are the same as Slope Vertical Shape, Field 9 below.

Field 9: 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. See previous graphic for examples (size 1/10 acre ocular estimate). At hilltops and depression bottoms, all directions are perpendicular to the contours and no direction is parallel. While the above definitions of horizontal and vertical shape really do not apply at these locations, both shapes are considered convex on hilltops and concave in depression bottoms, and their specific direction is irrelevant.



- | | | |
|----------------------------|---------------------|----------------------|
| BR Broken | CC Concave | CV Convex |
| LL Linear or Planar | PA Patterned | UN Undulating |
| UA Unable to Assess | | |

Field 10: Plot Elevation (5-digit)

Record the elevation, in feet, of the plot center. Accuracy Standard is ± 2 contour intervals on provided maps.

Field 11: Plot Existing Vegetation Composition Type (8-character)

Record the current (not potential) vegetative or non-vegetative type currently dominating the plot. Use canopy or foliage cover as the measure of dominance. See Appendix E for a complete list of Existing Cover Type codes.

Field 12: Plot Potential Vegetation (8-character)

Record the potential vegetation code for the plot. 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 (Habitat Type/Phase) will be determined for each plot, except for those stands identified in the Site List.

1. The plot h.t. shall be identified according to the procedures described in "Forest Habitat Types of Central Idaho", Steele et al, 1981. The first step in correctly identifying h.t. is becoming familiar with the instructions for use of the key. The next step is identifying the potential climax species, followed by the h.t and the phase. This shall be done by recording occurrence and the appropriate canopy coverage class of the most predominant indicator species for each sample plot. Four indicator species must be identified at each plot, if available. This reference information should give the correct h.t. for the site. To validate the key, review the written h.t. descriptions closely along with the constancy and coverage data within the publication.

To assist in identifying the correct h.t. the "Habitat Type Field Form" is available upon request to record the canopy coverages of the indicator species present. Completion of this form will assist greatly in the identification of the correct h.t. as edit information, and serve as a tool in the familiarization to Southwest Idaho habitat types. This is an optional form and not required to be turned with completed site.

2. The alpha codes are generally determined by using the first two letters of the genus name in conjunction with the first two letters of the species name. See App. H. List of Species.

Example:

- Abies Lasiocarpa series would read -- ABLA
- Vaccinium Globulare habitat type would read -- VAGL
- Vaccinium Scoparium phase would read -- VASC

The correct h.t. acronym in this example would be:

-ABLA VAGL-VASC

The habitat type is then given the corresponding Potential Veg. code. See App. G, Potential Vegetation Codes.

Example: ABLA VAGL-VASC = PV code 41721

In some cases sites may be delineated within several h.t. If this occurs record the type that best represents the entire site. If two h.t.'s occur in equal portions, select the drier of the two. Mention the other less dominant h.t.'s in the Setting Remarks (Field 39).

3. Habitat typing shall be done by estimating the percent coverage of all occurring indicator species within a 1/10 acre plot radius (37.2 ft. radius) surrounding the plot center. Record these estimates according to the

previous paragraph. When estimating percent cover of a specific plant consider how much of a radius it will cover around plot center. If it will cover a 3.6 foot radius plot that would constitute a 1% coverage. If the plant covers an 8 foot radius plot it would be 5% coverage. For larger percentages of cover, imagine crosshairs transecting the plot. Then estimate if specific plant species would take up 1/4, 1/2 or more of the plot radius. This is particularly helpful in estimating tree canopy coverages.

4. No variance from the correct h.t. shall be acceptable.

See Appendix G for a complete list of Potential Vegetation codes.

Field 13: Fuel Model (2-digit)

Record the fuel model that best describes the plot. Refer to local reference for descriptions (see contract).

2	Timber (grass and understory)
5	Brush (2 feet)
8	Closed timber litter, short needles
9	Hardwood litter, long needles
10	Timber (litter and understory)
11	Light logging slash
12	Medium logging slash

Field 14: Residual Descriptive Code (15-character)

Record the residual descriptive code or photo stand number of the corresponding photo selected. Photos provided may be from several different sources (see Fuel Photo Ref. Code, Field 31, Setting Form). Only photos from one source may be used per stand. Generally, this will be determined by timber type.

Field 16: Plot History (4-digit)

Record activities that occurred on the plot, or affected the plot. Multiple codes may be entered. For each additional event, record the plot number and history code 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

Field 17: Plot History Date (4-digit)

Record the 4-digit year in which a disturbance/activity occurred based on field observations.

Field 18: Distance to Seed Wall (3-digit)

Record the distance, in feet, from the plot center to the boundary of an adjoining stand 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. The accuracy Standard is ± 100 feet.

Field 19: Plot Remarks (242-character)

Enter remarks relevant to the plot. Special features (see Field 38 under Setting) may be noted here as well.

Tree Data

The accuracy standard is "No Errors" unless otherwise noted.

Field 1: Plot Number (3-digit)

Record the plot number for each line of tree data. Plot numbers should be unique within a setting.

Field 2: Tag ID Number (4-digit)

Record the tag ID number. 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. Each Tag ID is associated with a tree or a group of trees.

Field 3: Tree Status (1-character)

Code	Description
L	Live - includes all standing trees that have at least one green point of growth. This 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 - standing trees without a green point of growth. Note: many of the tree fields are not used if the tree is a dead tree. If dead trees are recorded, a snag decay class is required for extensive and intensive exam levels.
S	Stump - woody base of a tree left in the ground less than 4.5 feet tall. Note: many tree form fields are not used for stumps.
X	Down dead - includes all dead trees that have their main stem lying on the ground, or are supported by branch wood. A tree is considered down if it is leaning more than 45 degrees from vertical, not self-supporting, and/or in contact with the ground. Record any broken trees as one tree. If down trees are recorded, a log decay class is required for extensive and intensive exam levels. Only trees in decay class 1 or 2 should be recorded here.

Field 4: Tree Class (exactly 2 characters)

Tree Class is used to describe the condition of each 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. Each tree is assigned a Tree Class code individually, without regarding other trees in the stand. The assignment of Tree Class does not presume any particular stocking guidelines, cutting cycles, or rotation ages. Tree Class is partly predicated on whether the tree currently or potentially contains a merchantable sawlog. Merchantability standards are defined locally (as opposed to a national standard). See chart below.

Code	Tree Class	Live	Species	Vigor	Damages or Snag Decay Class
DE	Desirable	Y	Commercial	- Relatively vigorous for its age, as evidenced by past growth rate and/or crown condition	- No defects that will reduce merchantable sawlog yields - No damaging agent that affects growth or survival
AC	Acceptable	Y	Commercial	- Relatively non-vigorous for its age as evidenced by slow past growth and/or poor crown condition. - Still retains the potential to grow and accumulate net merchantable volume	- Has some minor defects which will reduce, but not totally exclude, merchantable sawlog yields - May possess damaging agents in minor amounts that will not affect survival of the tree for the next 10 years
UA	Un-acceptable	Y	Commercial	- Expected to die within next 10 years - Not accumulating net volume growth; deteriorating more rapidly than growing - If relieved of competition, it would not be expected to release and accumulate net merchantable volume	- Has a severe rating for any damaging agent - Does or will meet minimum merchantability standards
RF	Rough	Y	Non-commercial for sawlog yields	- Smaller than the minimum size for sawlog merchantability - Presently does not contain a merchantable live sawlog	- Not expected to yield any sawlog products because of severe damage other than rot - Principle defects are physical defects, including trees culled for multiple forks
RN	Rotten	Y	Any	- Presently does not contain a merchantable live sawlog - Smaller than the minimum size for sawlog merchantability	- Principle defect is rot - Not expected to yield any sawlog products because of severe damage by rot
SL	Salvable dead	N	Any	- Contains at least one merchantable sawlog	- At least 25% sound
US	Non-salvable dead	N	Non-commercial	- Does not contain at least one merchantable sawlog	- Less than 25% sound

Accuracy Standards:

Tree Class Code	Acceptable Tolerance
	*(providing damage/severity is correct and consistent with the tree class definition)
DE	DE,AC
AC	DE,AC,UA
UA	AC,UA (RF,RN)*
RF	RF (RN)*
RN	RN (UA)*
SL	SL,US
US	SV,US

Field 5: Site/Growth Trees (1-character)

Record if a tree is a Site or Growth Sample Tree. If tree is neither, leave blank.

G	Growth Sample Tree
S	Site Tree on Plot
F	Site Tree off Plot
B	Both a growth sample tree and an on-plot site tree

Site Tree (S)

Tree for which DBH age, height, and radial growth are measured to determine site index and yield capacity for a tree. Site trees have never experienced any overstory competition or damage that would reduce height growth during any period of their life. Freedom from height growth suppression is the single most important selection criteria for site trees. Site trees should be distributed throughout the stand as much as possible. Select trees whose microsite is representative of the rest of the stand. Site trees should be flagged around the bole of the tree with the Location, Stand, and plot number written on the flagging.

Site Tree Selection Criteria

1. Freedom from height growth suppression
 - Choose dominants or codominants.
 - No evidence of top damage, past or present.
 - No damage that could influence height growth
 - No pronounced period of radial growth suppression
2. Species Selection in order of species preference are as follows:

PSME habitat type - PIPO, PSME
ABGR habitat type - PIPO, PSME, LAOC, PIEN, ABGR
ABLA habitat type - PSME, PIEN, PICO, ABLA

If possible, selection shall include at least ONE EACH of the first two preferred species. At least two sites trees must be of the same species within a stand.

3. Have a crown ratio of at least 50%.
4. Tree of good form and high vigor. (Use trees with Tree Class “DE”, unless otherwise agreed upon)
5. Mistletoe is not greater than a severity of 2 and does not occur in the upper half of the crown.
6. Similar age class, preferably middle-aged, avoid old growth and young age classes. Typically > 35 years and < 200 years.
7. The number of site required site trees depends on the number of plots taken in the stand.

3 plots	3 site trees
4 plots	4 site trees
5 plots or more	5 site trees

Growth Sample Trees (GST) may be used as site trees if they meet all site tree criteria (code B). If the minimum number of site trees cannot be selected from the GSTs on the plots, select suitable site tree from other suitable trees on the plots (code S). If this is still not sufficient, collect site trees from off the plots (code F). Off plot site trees may be collected within sight distance of the plot center or along the transect between plots. If there are less than the minimum number of suitable trees on or off the plots, make note for the reason of lack of site trees in the Setting Remarks.

Growth Sample Trees (GST)

A growth sample tree is a tree for which growth (radial or height) and DBH age are measured, in addition to other measurements taken. Hardwoods, such as POTR5, will not be sampled as GSTs.

- If only one tree species is expected to be present in the stand, one large (≥ 5.0 " DBH) GST will be measured on each plot. Measure the first live standing tree when moving clockwise from north.
- If more than one tree species is expected to be present in the stand, two large (≥ 5.0 " DBH) GSTs will be measured on each plot. The first live standing tree of each species encountered, moving clockwise from north, will be measured until two trees of different species are assessed. For individual plots with only one species, select the first two live trees from north.
- For GSTs on the fixed plot (< 5.0 " DBH), select a representative tree from each species on the plot and collect height growth. GSTs on the fixed plot shall be from 6" in height to 1.0" DBH.

If age cannot be determined due to rot, select the next tree as GST.

Field 6: Tree Species (8-character) *Required*

Record the species of every sampled tree. See Appendix H for a list of common tree species codes.

ABGR	Grand fir (<i>Abies grandis</i>)
ABLA	Subalpine fir (<i>Abies lasiocarpa</i>)
LAOC	Western Larch (<i>Larix occidentalis</i>)
PIAL	Whitebark pine (<i>Pinus albicaulis</i>)
PICO	Lodgepole pine (<i>Pinus contorta</i>)
PIEN	Engelmann spruce (<i>Picea engelmannii</i>)
PIFL2	Limber pine (<i>Pinus flexilis</i>)
PIPO	Ponderosa pine (<i>Pinus ponderosa</i>)
POTR5	Quaking aspen (<i>Populus tremuloides</i>)
PSME	Douglas-fir (<i>Psuedotsuga menziesii</i>)

Field 7: Tree Count (3-digit) *Required*

Record the number of trees represented by each line of tree data. Record all trees ≥ 5.0 " DBH individually for intensive and extensive examinations. Trees may be recorded in groups for quick plot examinations.

Trees < 5.0 " DBH shall be grouped in diameter classes (see Field 8) by species, status, and damage. All trees grouped on a data line must within the diameter class recorded. All other fields recorded for the group shall be the average of the group. Growth Sample Trees collected on the fixed plot shall be recorded separately.

Height	Diameter	Trees on Plot	Missed Tree Tolerance
*All	All	0	0 trees
> 0.5' to <4.5'	NA	1-5	0 trees
> 0.5' to <4.5'	NA	6+	$\pm 20\%$
All	0.1" – 4.9"	1-5	0 trees
All	0.1" – 4.9"	6+	$\pm 10\%$
All	5.0" +	1+	0 trees

Field 8: Number of Stems (3-digit)

Record the number of stems for DRC measured species.

Field 9: DBH/DRC (3,1-digit)

DBH is outside bark diameter at 4.5 feet above the forest floor on the uphill side of the tree. To determine breast height, 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.

Forked tree: In order to qualify as a fork, the stem in question must be at least 1/3 the diameter of the main stem and must branch out from the main stem at an angle of 45 degrees or less. Forks originate at the point on the bole where the piths intersect. Forked trees are handled differently depending on whether the fork originates above or below 4.5 feet.

Trees forked below 4.5 feet are treated as distinctly separate trees. DBH is measured for each stem at 4.5 ft above the ground.

Trees forked at or above 4.5 feet count as one tree. If a fork occurs at or immediately above 4.5 ft, measure diameter below the fork just beneath any swelling that would inflate DBH.

Stump sprouts originate between ground level and 4.5 ft on the boles of trees that have died or been cut. Stump sprouts are handled the same as forked trees, with the exception that stump sprouts are not required to be 1/3 the diameter of the dead bole. Stump sprouts originating below 1.0 ft are measured at 4.5 ft from ground line. For multi-stemmed woodland species, treat all new sprouts as part of the same new tree.

Tree with irregularities at DBH: On trees with swellings, bumps, depressions, and branches at DBH, diameter will be measured immediately above the irregularity at the place it ceases to affect normal stem form. 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.

Tree on slope: Measure diameter at 4.5 ft from the ground along the bole on the uphill side of the tree.

Leaning tree: Measure diameter at 4.5 ft from the ground along the bole.

Turpentine tree: On trees with turpentine face extending above 4.5 ft, estimate the diameter at 10.0 ft above the ground and multiply by 1.1 to estimate DBH outside bark.

Independent trees that grow together: If two or more independent stems have grown together at or above the point of DBH, continue to treat them as separate trees.

Missing wood or bark: If 50% or more of the circumference of the bole is intact, reconstruct the diameter at DBH.

Diameter on stump: Use a logger's tape, cloth tape, or ruler to measure the longest and shortest axis across the top of the stump. Record the diameter as the average of the two measurements.

*	< .5' tall
(blank)	.5' tall < 4.5' tall
2.0	4.5' tall to 2.9" DBH
4.0	3.0" to 4.9" DBH
6.1	06.1 inches DBH
18.7	18.7 inches DBH

* do not collect data for these trees.

DRC is the outside bark diameter measured at the root collar or at the natural ground line, whichever is higher. A stem generally grows in an upright position and contributes to the main structural support of a tree crown. 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.) Whenever 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.

Accuracy Standards:

< 5.0" DBH	-	correct diameter class
≥ 5.0 " DBH	-	$\pm 1\%$ of actual diameter (round up)
Borderline variable plot trees	$\pm .1$ inch	(to determine trees in or out)

Field 10: Height (3-digit)

Record tree height, in feet, from ground line on the uphill side, to the uppermost tip. If the top is broken, record the height to the break, and record a tree damage of "broken top" (99-1). See Appendix P for details on measuring tree heights. Tree heights are required for all trees.

Accuracy Standards

Site trees	-	$\pm 3\%$ of actual tree height
All other trees	-	$\pm 10\%$, not to exceed ± 10 feet of actual tree height.

Field 11: Height to Crown (3-digit)

Record crown height, in feet, 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 Appendix Q for examples of determining height to crown. The accuracy standard is $\pm 10\%$.

Field 12: Radial Growth (2-digit)

Record the radial growth increment for Site and Growth Sample Trees ≥ 5.0 inches to the nearest $1/20^{\text{th}}$ of an inch. Make the increment boring at breast height facing plot center. Measure the width of the outer complete annual increments up to the number of years equal to the growth period entered on the Setting form with a $1/20^{\text{th}}$ of an inch scale ruler. Enter radial growth using integers only. See Appendix N for instructions on measuring radial growth. The accuracy standard is $\pm 2/20$ inch.

Field 13: Radial Growth # 2 (2-digit)

This field is not used in Region 4.

Field 14: Height Growth (2,1-digit)

Record height growth, to the nearest $1/10^{\text{th}}$ foot, for Growth Sample Trees that are from 6 inches tall to 1.0 inches in diameter. Measure the five most recent complete height increments of leader growth. See Appendix N for instructions on measuring height growth.

Accuracy Standard:

Tree height \geq 6 feet \pm 1 foot
Tree height $<$ 6 feet \pm 0.1 feet

Field 15: Tree Age (4-digit)

Record the tree DBH age, in years, for Growth Sample Trees and Site Trees. Additional age measurements may be recorded for other live sample trees. Record age at DBH for trees 5.0 inches DBH and larger. Age is determined from an increment boring made at DBH and is the annual ring count to the pith of the tree. See Appendix O for details on how to determine tree age from increment borings.

If total age cannot be determined because of extensive heartrot, and this is a growth sample tree or a site tree, select another tree. If recording age for other live sample trees, leave this field blank.

Accuracy Standard: \pm 10% (Based on actual tree ring count at breast height for trees \geq 5.0" DBH.)

Field 16: Crown Ratio (3-digit)

Record crown ratio, in 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. Compressing the live crown length because the crown appears "sparse" or contains "unhealthy" foliage is not appropriate. See Appendix Q for information on measuring crown ratios. Accuracy Standard: \pm 10 percent.

Field 17: Crown Class (2-character)

Record the crown class for all live trees. Crown class is the description of the relative position of the tree crown with respect to competing vegetation surrounding the tree. Crown classes are a useful descriptor of competitive status of trees in all structural types of stands. The Crown Class for each tree is determined in the context of competition for sunlight or moisture between the subject tree and its immediate environment, trees, or shrubs.

Classifications are more difficult to assign in uneven-aged stands or in plots where more than one stand is present. In these situations, classify the tree based on its immediate environment. Base your classification on how much light the tree's crown is receiving, not its position in the canopy. The intermediate and overtopped crown classes are meant to include trees seriously affected by direct competition with adjacent trees. For example, a young, vigorous tree that is considerably shorter than other trees in the stand but not overtopped by other trees, and receives full light from above and partly from the side, is classified as dominant. The same principle applies to two-storied stands: understory trees should only be assigned subordinate crown classes if they are adjacent to overtopping trees. In plots with scattered residual overstory trees over younger trees, a considerable portion of the understory trees will be classified as dominant or codominant.

Code	Name	Description
OP	Open-grown or Isolated	Tree crowns receive full light from above and from all sides. 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. Crowns extend above the general level of the crown cover of others of the same stratum and 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 form a general level of crown stratum, are not physically restricted from above and are crowded by other trees from 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.
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.
IB	Leader Within Brush	The terminal leader and upper crown of the tree is within the brush canopy.
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; therefore, brush cover crown 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.

Field 18: Crown Width (3-digit)

Record the average crown width, in feet. Crown width is the average of two measurements: 1) widest distance anywhere in the crown between the outer ends of two live branches (the drip line); and 2) the distance perpendicular to the widest measurement. Abnormally long branches sticking out beyond the edge of the crown are not used in establishing the extent of a crown.

A tree's widest crown measurement, if viewed from the air, is the diameter of a circle including all foliage. Measure it at the crown's widest point with a tape held by two crew people standing under opposite drip lines at the crown's edges. Make the second measurement at 90 degrees to the crown diameter at the widest point using the same procedures.

With shoulders parallel to the tape, determine drip line end points by looking up perpendicular to the tape and projecting where crown edge branch tips would hit the ground if they fell. Occasionally, a branch may protrude abnormally, but the lateral crown line is drawn across the portion of the branch, which includes the "normal outline" of the tree. It is helpful to use a device, such as a clinometer, that allows the observer to measure a line perpendicular to the ground. The clinometer should be used for training and to check estimates made during the operational field season. If you cannot see the crown edge from directly beneath the drip line, both observers should move an equal distance away from the tree and make your estimate. All measurements are rounded to the nearest foot. Crown width measurements or estimates can be used to compute crown volume and surface area.

Accuracy Standard: $\pm 10\%$ for Intensive Exams
 $\pm 20\%$ for Extensive and Quick Plot Exams

Field 19: Wildlife Use (2-character)

Record stem characteristics that may indicate the presence of wildlife.

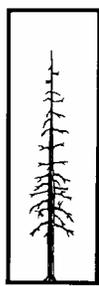
NO	No wildlife characteristics observed
SC	Small cavities less than 3 inches in diameter
LC	Large cavities greater than 3 inches in diameter
LB	Loose Bark
FH	Foraging Holes/Flaked Bark: Antler Rubs, Porcupine feeding
NE	Nest in tree and not in cavity

Field 20: Log/Snag Decay (1-digit)

Record the condition of standing dead (snag) or down dead trees (log). The pictures and descriptions below are adapted from "Wildlife Habitats in Managed Forests of the Blue Mountains of Oregon and Washington" by Jack Ward Thomas, Agriculture Handbook No. 553, USDA Forest Service, September 1979. Use the descriptions when determining decay class, the pictures are a general representation. The "hardness" and time since death of the tree are what counts.

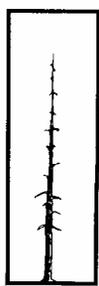
Snag Decay

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. 1/3	Mostly intact	>5 years
4	75% missing	Incipient to advanced	25%+	Few remain	Approx. 1/3 to 1/2	Losing form, soft	>5 years
5	75%+ missing	Advanced to crumbly	50%+ advanced	Absent	Approx. 1/2+	Form mostly lost	>5 years



Class 1

Dead / recent



Class 2



Class 3



Class 4

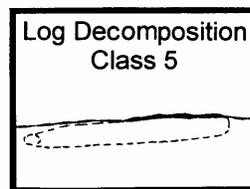
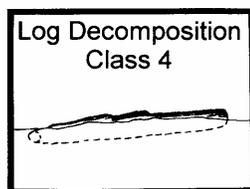
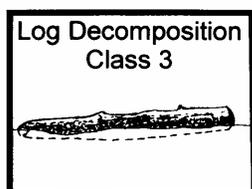
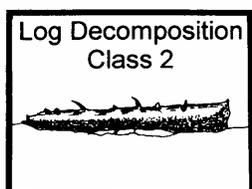
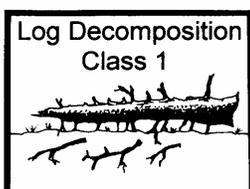


Class 5

Log Decay

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

*Implies recent mortality, within the last 5 years.



Field 21: Cone Serotiny (1-digit)

Record the open or closed condition of the majority of a tree's viable cones for lodgepole pine and jack pine. Only consider the cones on the tree, not cones on the ground. Trees have closed cones (serotinous) if more than 50% of the cones are closed.

Code	Description
0	No Cones
1	Open/Opening Cones
2	Closed Cones
3	Intermediate - Both Open and Closed Cones

Tree Damage

Record the tree damage code for live and dead trees, based on physical evidence. For dead trees, no cause of death is required, although a damage that is recorded may have resulted in the death of the tree. If category is recorded, severity is required. Multiple damage codes may be recorded for each tree, with a maximum of three. See Appendix R for a complete listing of Category, Agent, Part, and Severity codes. Refer to Common Stand Exam Insect and Disease Handbook (govt furnished property) for agent descriptions.

Field 22: Tree Damage Category (2-digit)

This field required for all trees coded with damage. For descriptions of damage categories and agents, see the Common Stand Exam Insect, Disease, and Damage Handbook.

Field 23: Tree Damage Agent (3-digit)

This field required for Damage Categories 50, 70, and 99.

Field 24: Tree Damage Part (2-character)

This field not required.

Field 25: Tree Damage Severity (2-digit)

This field required for all trees coded with damage.

Note: The tree damage severity (except severities for category 99) must be entered into the database preceded by the 2-digit category code. For example, a mistletoe severity of “3” must be entered as 233. When using a PDR and field forms, only the severity rating needs to be recorded; however, when typing this value into the database via the electronic forms, the severity code **MUST** be preceded by the 2-digit category code.

Category	Category Description	Tolerance
11	Bark Beetles	No misses on live trees with a severity of 2 or greater.
12	Defoliators	No misses on live trees with a severity of 3 or greater.
13-17	Other Insects	No misses of shoot moths or weevils on live trees.
21	Root/Butt Diseases	No misses on live trees with a severity of 2 or greater.
22	Stem Decays/Cankers	No misses on live trees with a severity of 3 or greater.
25	Foliage Diseases	No misses on Elytroderma on live trees.
41-42	Animal Damage	No misses on live trees with terminal leader damage or with greater than 1/4 of bole circumference affected.
50	Abiotic Damage	No misses on wind, snow, or ice bending, breakage, or bole cracks and frost damage to shoots on trees less than 1-inch diameter and lightning.
70	Human Damage	No misses on live trees for logging damage or fire if the damage affects

		greater than 1/4 of the bole circumference or if an open wound is in contact with the ground.
99	Physical Effects	No misses on Agents 001, 002, 005; No misses on live trees with a severity of 20 % or greater, No misses on agents with a severity of severe.

Field 26: User Defined

Not used at this time

Field 27: Tree Remarks (30-character)

Record information unique to the tree. Make note of abnormal DBHs, limiting distance notes (dbh, slope, measured distance), distance and azimuth from plot center to off plot site trees, and any other pertinent remarks.

Field 28: Treatment Option (1 digit)

Cut and leave treatment option. Legal values are 1-9. A “1” is automatically interpreted as “cut” in the Forest Vegetation Simulator (FVS) program. Not used at this time.

Vegetation Composition

The optional Vegetation Composition protocol is used to collect ocular estimates of cover by lifeform and layers for trees, shrubs, forbs, and grass species within a fixed area. It provides a fast and practical sampling method to collect information on plant composition and structure to meet a variety of vegetation composition purposes.

There are four different levels of intensity that may be used to record vegetation composition.

Exam Level Code	Interested in Obtaining	Species to record	Subpop. Min.	Subpop. Max.	Form 1	Form 2	Form 3	Form 4
1	Quick estimate	Life form only	1%	100	Required	Optional	Optional	Optional
2	TES, NOX, and/or the dominant four species	Only specific species	User defined	100	Required	Required	Optional	Optional
3	All species	All species to a specified %	User defined	100	Required	Required	Optional	Optional
4	All species, including TES and NOX to trace	All species to a specified %, but species on a list to trace	User defined	100	Required	Required	Optional	Optional

Level 0 – Not Done: Vegetation Composition data was not collected.

Level 1 – Life Form: Individual species are not recorded. Percent cover is recorded by life form, and layers within the tree and shrub life forms. Only Form 1 is required, all other forms are optional.

Level 2 – List: Only species on a "list" are recorded, if they occur above the user specified minimum cover level. A list of species could include threatened, endangered, and sensitive (TES) species, noxious (NOX) species, invasive plants, management indicator species, the dominant four species, etc. If only the dominant four species are being recorded, enter "DOM4" in the Sample Design remarks field. The sample design subpopulation minimum value is set to the minimum cover percent a species must have to be recorded. To record all species on a list to a "trace" level, set the subpopulation minimum to 0.1 %. A reference to the list is placed in the Sample Design Form remarks column. If only the dominant four species are being recorded, enter "Dom4" in the Sample Design Remarks field.

Level 3 – All Species: 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 have to be recorded. To record all species to a "trace" level, set the subpopulation minimum to 0.1 %.

Level 4 – All Species Plus a List: All species are recorded, if they occur above the user specified minimum cover level. In addition, any species on a "list" is recorded if it occurs at trace amounts. A list of species could include threatened, endangered, and sensitive (TES) species, noxious (NOX) species, invasive plants, management indicator species, the dominant four species, etc. The sample design subpopulation minimum value is set to the minimum cover percent a species must have to be recorded. A reference to the list is placed in the Sample Design form remarks column.

Plot Data

Plot Location: If tree and/or down woody material are being sampled, use the same plot center for the vegetation composition plots. If data other than vegetation composition is being collected, the order in which the data is collected may be important. Vegetation composition and down woody material data may be more accurate if collected prior to collecting tree data due to the effects of trampling.

There are five different ways to measure vegetation composition. Each of these methods is discussed in detail below:

1. Total cover
2. Cover broken out by life form
3. Cover broken out by life form and layer
4. Cover broken out by layer and species
5. Cover broken out by species

Form 1: Total Cover and Cover by Lifeform

This form is required for all exam levels. It provides information on horizontal and vertical distribution and diversity of these attributes for all vegetation, by lifeform (grass, forb, shrub, tree) and by height classes for shrubs and trees.

For the tree and shrub lifeforms, canopy cover is recorded by lifeform and by defined layers within those lifeforms. The canopy cover of these layers describes the horizontal structure of a setting in more detail.

On this form, cover percent is always taken to the nearest 1%. White fields are required, lightly shaded fields are optional, and darkly shaded fields are not allowed.

Life Form	Layer	Layer Code	Canopy Cover (%)	Predom. Height	Predom. DBH or DRC	User Defined Data	Remarks
	Total Vegetation	TV		XXX	XXX		
Total Tree		TOT			XXX		
	Trees ≥ 6.1 TOV	TOV					
	Trees ≤ 6.0' TSA	TSA					
Total Shrub		TOS			XXX		
	Shrubs ≥ 6.1'	ST			XXX		
	Shrubs 1.6-6.0'	SM			XXX		
	Shrubs < 1.6'	SL			XXX		
Total Forbs		TOF		XXX	XXX		
Total Graminoids		TOG		XXX	XXX		

Form 2: Cover by Species and Layer

This form is required for exam levels 2-4. It describes the distribution of each tree and shrub species within the layers present in the setting.

If an intensive level of the tree form is being used in addition to this vegetation form, the predominant height and predominate age need not be recorded. However, on the intensive tree level the ages are collected for growth sample trees and site trees, not for all trees. These trees are not representative of the entire stand and may give a biased estimate of the layer/species ages.

Only species that have a canopy cover above the minimum canopy cover percent recorded in the Sample Design Form, and species occurring on a list (Exam Level 2 or 4) are recorded.

Life Form	Layer	Layer Code	Species	Canopy Cover (%)	Predom. Height	Predom. DBH or DRC	Predom. Age	Maturity	Shrub Form	User Defined Data	Remarks	
Tree	≥ 6.1'	TOV							XXX			
		TOV							XXX			
		TOV								XXX		
	< 6.1	TSA								XXX		
		TSA								XXX		
		TSA								XXX		
Shrub	≥ 6.1'	ST				XXX	XXX					
		ST				XXX	XXX					
		ST					XXX	XXX				
	1.6-6.0'	SM					XXX	XXX				
		SM					XXX	XXX				
		SM					XXX	XXX				
	< 6.1	SL					XXX	XXX				
		SL					XXX	XXX				
		SL					XXX	XXX				

Form 3: Cover by Species

This form is optional for all exam levels. It describes the canopy cover of each plant species on the plot

All species that have a canopy cover above the minimum canopy cover percent recorded in the sample design form, and species occurring on a list (if using exam level 2 or 4) are recorded. Only three species lines are shown for each life form, additional lines may be necessary. White fields are required, shaded fields are optional.

Life Form	Species	Canopy Cover (%)	User Defined Data	Remarks
Tree				
Tree				
Tree				
Shrub				
Shrub				
Shrub				
Forb				
Forb				
Forb				
Graminoid				
Graminoid				
Graminoid				

Form 4: Ground Surface Cover

This form is optional for all exam levels. It is used to collect ground surface cover data that is not a specific PLANTS species. Ground surface cover data describes the ground surface.

White fields are required, shaded fields are optional. Total ground surface cover of all features **must equal 100%** (foliar canopy cover above the soil surface plane is not considered to be ground surface cover).

Ground Surface Cover Type	Cover (%)	Remarks

Field 1: Plot Number (3-digit)

Record the plot number for each line of tree data. Plot numbers should be unique within a setting.

Field 2: Life Form Definitions (exactly 2 characters) *Required*

These definitions are consistent across all of the NRIS modules, and are approved national codes.

Code	Description	Definition
TR	Woody Tree	Perennial, woody plant with a single stem (trunk), normally greater than 4 to 5 meters or 13 to 16 feet in height; under certain environmental conditions, some tree species may develop a multi-stemmed or short growth form (less than 4 meters or 13 feet in height).
SH	Woody Shrub	Perennial, multi-stemmed woody plant that is usually less than 4 to 5 meters or 13 to 16 feet in height. Shrubs typically have several stems arising from or near the ground, but may be taller than 5 meters or single-stemmed under certain environmental conditions.
FB	Herbaceous forb/herb	Vascular plant without significant woody tissue above or at the ground. Forbs and herbs may be annual, biennial, or perennial but always lack significant thickening by secondary woody growth and have perennating buds borne at or below the ground surface.
GR	Herbaceous graminoid	Grass or grass-like plant, including grasses (Poaceae), sedges (Cyperaceae), rushes (Juncaceae), arrow-grasses (Juncaginaceae), and quillworts (Isoetes).
HB	Herbs	Combination of all graminoids and forbs. This is required for FGDC Vegetation Classification Standard (1997).
AL	Algae	A general name for the single-celled plant plankton, sea weeds, and their freshwater allies.
LC	Lichen	Organism generally recognized as a single plant that consists of a fungus and an alga or cyanobacterium living in symbiotic association. Often attached to solid objects such as rocks or living or dead wood rather than soil.
FU	Fungus	A non-flowering plant of the kingdom Fungi, all lacking chlorophyll.
LI	Woody Liana	Climbing plant found in tropical forests with long, woody rope-like stems of anomalous anatomical structure.
SS	Woody Subshrub/half-shrub	Low-growing shrub usually under 0.5 meters or 1.5 feet tall (never exceeding 1 meter or 3 feet tall) at maturity.
VI	Herbaceous Vine	Twining/climbing plant with relatively long stems can be woody or herbaceous.
NP	Nonvascular plant	Nonvascular, terrestrial green plant, including mosses, hornworts, and liverworts. Always herbaceous, often attached to solid objects such as rocks or living or dead wood rather than soil.
UN	Unknown	Growth form is unknown.
VP	All vascular plants	

Field 5: Species (maximum of 8 characters and/or numbers)

Record the plant species using the NRCS PLANTS database codes. Do not repeat species codes within a layer. Identify plants to species, if possible, otherwise identify to the genus level. Include plants if their crowns overhang the plot area, even though their root systems may not be within the plot area, except when sampling small narrow riparian communities. In such riparian communities, overhanging trees rooted outside the community (across an ecotone) should not be included in the species list.

Floristic classification requires accurate plant identification. Correct species identification is more important than accuracy in cover estimates.

Examples:

VAGL	<i>Vaccinium globulare</i>	Blue Huckleberry
CAGE2	<i>Carex geyeri</i>	Elk Sedge
AGROP2	<i>Agropyron spp.</i>	Wheatgrass

Accuracy Standards: No Error in species level identification for dominant, common, or community indicator plants.

Field 6: Canopy Cover (maximum of 3 numbers; may include one decimal) *Required*

Canopy cover is "*the percentage of ground covered by a vertical projection of the outermost perimeter of the natural spread of foliage of plants. Small openings within the canopy are included (SRM 1989, NRCS 1997)*". For woody plants, canopy cover is synonymous with crown cover (NRCS 1997, Helms 1998).

Do not include cover by a dead tree or shrub, or portion of a dead tree or shrub (that will not recover) in cover estimates. However, cover should be estimated for the current season's annual forb and graminoid species that have already died. Perennial forbs and graminoids may also appear dead, but are actually in an inactive or dormant stage – these plants should also be included in the cover estimates. If included in the sample design or exam level, use 0.1 as "trace" for items present but clearly less than 1 % cover.

Do not record species whose canopy does not intersect the plot. Information about species that occur outside the plot can be recorded in the plot remarks, but cannot be included in the plot data or used in data analysis. If sampling is consistently missing important species, then a larger plot size should be used throughout the entire sampling area.

You may never enter a canopy cover value that is greater than 100%. However, if the canopy cover values for all species within a layer are totaled, and the sum may be greater than 100%. Likewise, if the canopy cover values for a species between all layers is totaled, the sum may be greater than 100%.

Accuracy Standards:

- ± 1 % for cover between 1-10%
- ± 5% for cover between 10%-30%
- ± 10% for cover over 30%

Field 7: Predominant Height (maximum of 3 numbers)

Record in feet to the nearest foot. Heights less than two feet can be recorded to the nearest 1/10th foot. Predominant height is the distance from the base of the plant on the high side at ground level to the tip of the plant.

Accuracy Standards: ± 10% of height

Field 8: Predominant Diameter (maximum of 3 numbers)

Estimate diameter at either breast height (DBH) or at root collar (DRC) depending on the species. See Appendix N for a complete listing of DRC species. Record the predominant diameter to the nearest inch.

Valid values are 1-999

Field 9: Predominant Age (maximum of 3 numbers)

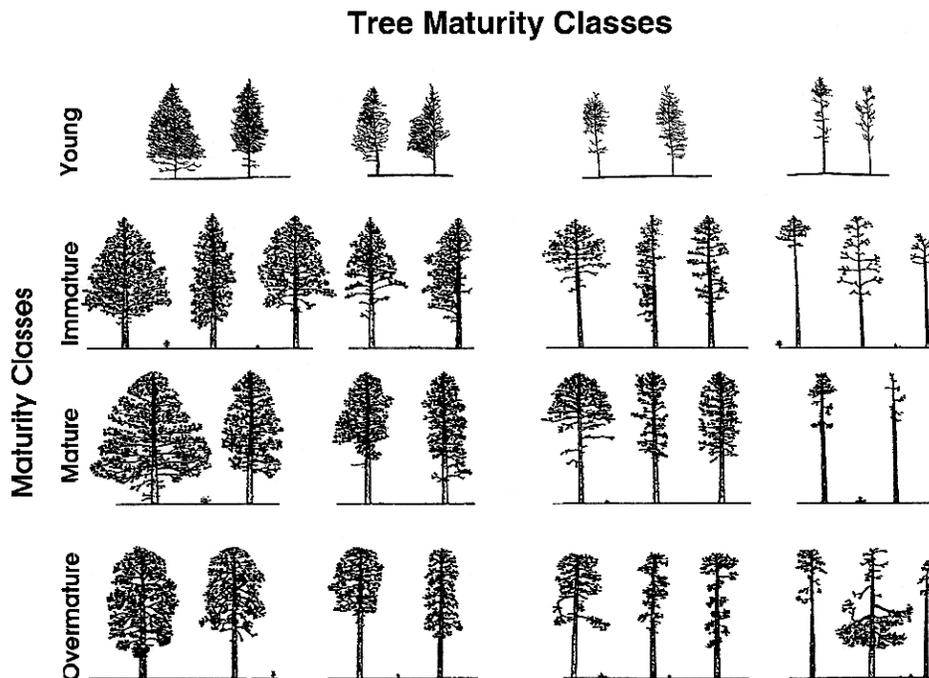
If tree data are collected on the tree form, this value is redundant. Age data collected on the tree form, according to growth sample tree selection protocol, provides an unbiased and more accurate estimate of age. Record the age in years. Core samples may be used. Take a sample core(s) at the same height as the diameter, either DRC or DBH. Count the actual number of rings. If diameter and age are measured at DBH, do not add additional years for the plant to reach 4.5 feet.

Field 10: Maturity (maximum of 2 characters)

Indicate relative maturity or physiological age, rather than actual age. Differences in site, elevation, moisture, and other environmental factors influence the age at which a tree reaches maturity. Trees generally reach maturity earlier on poor sites than on good sites. The maturity class descriptions are most related to conifer species. Look at stem form, bark color, and age to determine similar relationships for hardwoods. Maturity may be a substitute for boring trees to determine age.

Code	Tree Maturity Class	Description	Crowns	Branches	Bark
YO	Young	Tree appears young	Pointed	Distinct whorls, upturned, small in comparison with the main stem	Generally smooth and not platy
IM	Immature	Tree appears middle-aged	May be pointed or slightly rounded, but never flat	Slightly flattened lower branches	Slightly rough, plates or furrows beginning to form
MA	Mature	Tree slightly showing age	Pyramidal or rounded, occasionally pointed	Flattened lower branches	Rough, somewhat platy or furrowed
DE	Overmature Or Decadent	Tree shows age	Flattened or rounded, but never pointed	Open, large, gnarled, or misshaped upper branches	Platye or deeply furrowed

Use the picture below to assist in determining maturity for conifer species. Recognize the change in crown shape from young to over-mature. As the tree matures, the top becomes flat, branches appear flat to drooping, giving a more cylindrical rather than conical shape, and branches become larger. For ponderosa pine, the amount of needles growing along the length of each branch decreases. In over-mature trees, the branches show tufts of needles at the ends.



Field 11: Shrub Form Class (maximum of 4 characters)

Shrub form class is based on the availability of browse plants and the degree of hedging. These factors, along with age structure, can assist in determining the relative health of a browsed stand and can aid in evaluating trend. Availability represents the relative amount of twig growth that is within reach of grazing animals. Snow depth or duration has no bearing on availability. Hedging is the result of repeated utilization and is one of the factors that effects availability of shrubs. The general appearance of the plant is a primary criterion in determining degree of hedging.

Code	Abbreviation	Description
HIMV	Mostly/Highlined	Mostly available, highlined
HIUN	Unavail/highlined	Unavailable, highlined
LIAV	All/little	All available, little or no hedging
LIHE	Little or no hedging	2-year wood is relatively long/unaltered or slightly altered
LIPA	Partial/little	Partially available, little or no hedging
MOAV	All/moderate	All available, moderate hedging
MOHE	Moderately hedged	2 year wood is fairly long but altered from normal growth form
MOPA	Partial/moderate	Partially available, moderately hedged
SEHE	Severely hedged	2 year wood is relatively short and/or strongly altered
SEPA	Partial/severe	Partially available, severely hedged
SOAV	All/severely	All available, severely hedged

Field 12: User Code (maximum of 4 characters and/or numbers)

Enter an optional, locally defined code for this field. These codes will be stored in a generic FSveg database field and will not be accessible via the nationally supported reports. Contact your Regional representative to determine the use, if any, for this field in your Region.

Field 13: Remarks (maximum of 20 characters and/or numbers)

Enter optional notes about a species or layer record in Form 3 or 4. Use this space to record the scientific name of the species if the correct NRCS Plant Code is unknown.

Field 14: Ground Surface Cover Type (exactly 4 characters) *Required*

Record the major ground surface cover categories. Select ground cover categories that are visible when looking down. At times items will overlay each other. When this occurs the portions of each item that are viewed from above is what will be selected and recorded.

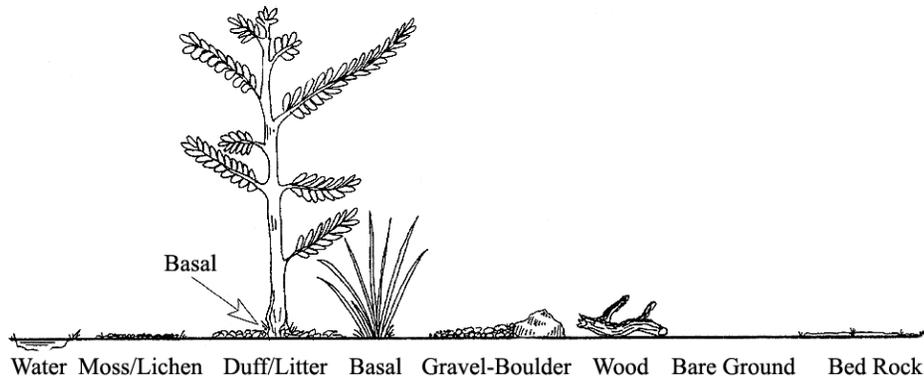
Code	Description	Definition
ROCKS		
ROCK	Rock	Relatively hard, naturally formed mineral or petrified matter >1/8 inch in dia. appearing on soil surface as small to large fragments or as rel. large bodies, cliffs, outcrops or peaks. Includes bedrock.
GRAV	Gravel (2-75 mm)	Rock fragments between 2 and 75 mm in diameter.
FIGR	Fine gravel (2-5 mm)	Rock fragments between 2 and 5 mm in diameter.
MEGR	Medium gravel (5-20 mm)	Rock fragments between 5 and 20 mm in diameter.
COGR	Course gravel (20-75 mm)	Rock fragments between 20 and 250 mm in diameter.
COBB	Cobbles (70-250 mm)	Rock fragments between 75 and 250 mm in diameter.
STON	Stones (round and flat)	
ROST	Round stone (250-600 mm)	Rock fragments between 250 and 600 mm in diameter.
BOUL	Boulders (round and flat)	Rock > 600 mm in diameter or length. Generic term for use when boulders are not differentiated by round and flat.
ROBO	Round Boulder (>600 mm)	Round Rock fragments >600 mm in diameter.
CHAN	Channers (2-150 mm long)	Long, thin rock fragments up to 150 mm in length, as determined by National Cooperative Soil Survey.
FLAG	Flag Stones (150-380 mm long)	Flag Rock fragments 150-380 mm long.
FLBO	Flat Boulders (>600 mm long)	Flat Rock fragments >600 mm long.
FLST	Flat Stone (380-600mm long)	Flat Rock fragments between 380 and 600 mm long.
BEDR	Bedrock	A general term for the rock, usually solid, that underlies soil or other unconsolidated, superficial material.
PAVE	Pavement	A natural concentration of closely packed and polished <u>stones</u> at the soil surface in a desert (may or may not be an erosional lag).
RROC	Rock fragments	Rock fragments >19.1 mm (3/4 inch) in diameter.
WATER, SNOW, AND ICE		
WATE	Water	Where the water table is above the ground surface during the growing season, such as streams, bogs, swamps, marshes and ponds (FIA definition).
TRIC	Transient ice	Ice covering the surface; the ice will melt during the growing season.
TRSN	Transient snow	Snow covering the surface; the snow will melt during the growing season.
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.
PEIC	Permanent ice	Ice covering the surface. Does not melt during the growing season. The surface is ice-covered for the entire year (i.e., glaciers).
PESN	Permanent snow	Snow covering the surface; does not melt during the growing season. The surface is snow-covered for the entire year.
PEIS	Permanent ice and snow	Surface area covered with ice and snow at the time of plot measurement, considered permanent. For use when permanent ice and snow are not differentiated.
WOODY PIECES		
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).

Ground Surface Cover Type (cont.)

Code	Description	Definition
MOSS, LICHEN, FUNGI		
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).
CML	Cryptogams, mosses, and lichens	For situations where information is not further differentiated.
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.
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.
DUFF AND LITTER		
LITT	Litter and duff	Leaf and needle litter, 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).
BASAL VEGETATION		
BAVE	Basal vegetation	Basal vegetation not differentiated by life form. For use when basal vegetation is not separated into more detailed codes (BAFO, etc.).
BATR	Basal tree	Basal (cross-sectional area at or near the ground level) cover of trees. (Definition adapted from definition of basal area in National Range & Pasture Handbook)
BASH	Basal shrub	Basal (cross-sectional area at or near the ground level) cover of shrubs.
BAFO	Basal forb	Basal (cross-sectional area at or near the ground level) cover of forbs.
BAGR	Basal graminoid	Basal (cross-sectional area at or near the ground level) cover of grasses or grass-like plants.
OTHER		
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).
BARR	Barren	Areas naturally devoid of vegetation, such as intermittent lakebeds and saline flats. Does not include areas denuded of vegetation.
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.
ROAD	Road	Improved roads, paved roads, gravel roads, improved dirt roads and off-road vehicle trails regularly maintained or in long-term continuing use. Generally constructed using machinery. Includes cutbanks and fills.
TEPH	Tephra volcanic	A general term for all material formed by volcanic explosion or aerial expulsion (as opposed to flow) from volcanic vent.
UNKN	Unknown	Other covers not defined elsewhere.

Note: Basal Vegetation is the soil surface occupied by the live basal or root crown portion of vascular plants. This includes live trees. This is not the foliar cover of plants. Typical basal plant cover ranges between 3-7 percent; 15 percent is very high and rarely encountered.

Ground Surface Cover Categories



Field 15: Ground Surface Cover Percent (maximum of 3 numbers; may include one decimal) *Required*

Record the estimated percent ground cover at the soil surface plane for each ground surface cover type. Cover is defined as that portion of the horizontal surface layer intersected by ground surface features. Total ground surface cover of all features **must equal 100%** (foliar canopy cover above the soil surface plane is not considered to be ground surface cover).

Whether moss covering a rock is recorded as "moss" or "rock" depends on the exam objective. Record the code that describes the soil surface and meets the exam objective. Record moss that is growing directly on the soil surface as "moss."

Code	Description
10	10%
18	18%
0.5	½ of 1%

Accuracy Standards: ± 10 percent

Down Woody Material

Downed woody material is the dead twigs, branches, stems, boles of trees, and brush that have fallen and lie on or above the ground. The accuracy standard is "No Errors" unless otherwise noted.

*For a more detailed explanation of sampling methods and procedures, please refer to Appendix S *.

Field 1: Plot Number (3-digit) Required

Record the unique plot number where the information is being collected.

Fields 2 and 3: First Duff (+litter) and Second Duff (+litter) (2,1-digit)

Record duff to the nearest 1 inch. . Duff is the fermentation and humus layers of the forest floor. For stand examinations in Southern Idaho, this measurement is taken from top of the mineral soil to the top of the litter layer (including twigs less than .25 inches). This information is required by the R4 FVS Hazard program.

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 where the depth is measured. Take the first duff measurement 6 inches from the bole of the largest tree on the variable plot, on the uphill side, and record it in the "First Duff" column. Take the second duff on the same side of the same tree, half way between the bole and the drip line of the tree 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. Measure through rotten logs whose central axis is in the duff layer. The accuracy standard is ± 1 inch.

Field 4: Fuel Depth (2,1-digit)

Record the total vertical dead fuel depth, in feet, to the nearest tenth. Take three equally-spaced measurements, along the longest transect, and record the average depth. The fuel bed is the accumulation of dead, woody residue on the forest floor. It begins at the top of the duff layer and includes dead branches and boles from trees, and dead material from shrubs, herbs, and grasses. Dead branches on trees, and dead stems and branches still attached to the ground (i.e. standing dead plants) are not included. Measure from the top of the duff layer to the highest dead particle above the point to the nearest tenth foot. On suspended logs, (e.g. spanning a ravine) enter the distance between the top of the duff layer to the top of the log.

Accuracy Standard: $\pm 20\%$

Field 5: Twig 1 (0 - .24) 1-hour fuels (maximum of 3 numbers)

Record the number of small twig intersections for each sampling plot. Small twigs are defined as pieces that have a cross section diameter of less than 1/4 inch at the point of intersection with the sampling plane. The accuracy standard is $\pm 40\%$.

Field 6: Twig2 (.25 - .99) 10 hour fuels (3-digit)

Record the number of large twig intersections for each sampling plot. Large twigs are defined as pieces which have a cross section diameter of between .25 and .99 inches inclusive at the point of intersection with the sampling plane. The accuracy standard is $\pm 30\%$.

Field 7: Twig3 (1.0 - 2.99) 100 hour fuels (3-digit)

Record the number of branch intersections for each sampling plot. Twig3 pieces are defined as pieces with a cross section diameter of between 1.0 and 2.99 inches inclusive at the point of intersection with the sampling plane. The accuracy standard is $\pm 20\%$.

Field 8, 10, 12, and 14: Volume (6,1-digit)

These fields are not used in Region 4.

Field 9, 11, 13, and 15 : Weight (3-digit)

Record the average tons per acre in each twig class and for all pieces larger than 3.0 inches as determined by fuel photos.

Field 16: Piece Count (3-digit)

Record the number of large pieces (3 inches and larger 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 (Appendix S) or as specified in the Sample Design Form. If pieces are still touching, it is still considered on piece.

Code	Description
1	This is the default value and normally the value used.
3	Three pieces are all rotten or all sound and have the same diameter.

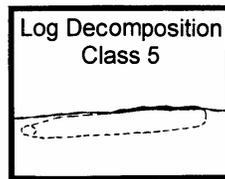
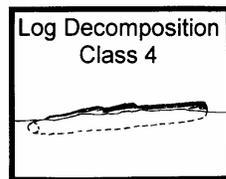
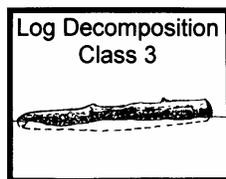
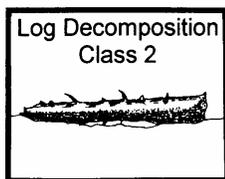
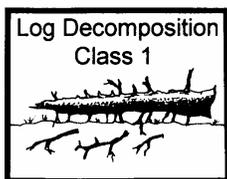
Accuracy Standard: No missed pieces

Field 17: Decay Class (1-character)

Record the decay class (1-5) for the large woody pieces (3 inches in diameter and larger or as stated on the Sample Design Form). See Appendix S for information on measuring down woody material.

Log Decay Class

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



Field 18: Diameter (3,1-digit)

Record the diameter of each intersected large piece (3 inches in diameter or larger or as stated on the Sample Design Form). If a fixed area plot is installed, instead of a transect, record the diameter of the piece at its midpoint.

Accuracy Standard: ± 1 inch

Field 19: Piece Length (3,1-digit)

Record the piece length, in feet, of each large piece (3 inches in diameter or larger or as stated on the Sample Design Form). Sound and rotten pieces are tallied separately.

Brown's Formula Protocols

When collecting Down Woody Material data according to Brown's protocol, set up the sample design form as follows:

Form Type	Sample Selection Method	Sample Expansion Factor	Subpop Status	Selection Criteria Number	Subpop. Variable	Subpop. Minimum Value	Subpop. Maximum Value
Down Woody	TRN	7	Down	1	DIA	0.1	.24
Down Woody	TRN	7	Down	2	DIA	.25	.99
Down Woody	TRN	7	Down	3	DIA	1.0	2.99
Down Woody	TRN	27	Down	4	DIA	3.0	999.9