FIELD MANUAL FOR POST-HARVEST VEGETATION SAMPLING: 2000
DEMONSTRATION OF ECOSYSTEM MANAGEMENT OPTIONS (DEMO) STUDY

* not all grid points — only those sampled for understory vegetation.

GENERAL NOTES

"HEADER" INFORMATION ON ALL DATA FORMS

The following "header" information—present on all field sheets—should be completed, prior to taking any measurements within a plot.

Page ____ of _____. For many of the format (data) types, only one field sheet will be needed per plot; but for others more than one sheet may be used. When more than one sheet is used, pages should be numbered sequentially and after sampling is completed the total number of pages should be entered on each page (i.e., Page 1 of 3, Page 2 of 3, Page 3 of 3). If only one sheet is used, enter "Page 1 of 1". If a continuation form is necessary, place a check mark in the **Cont.?** ____ field of each additional data form (leave it blank on the first page). These procedures make it possible to detect loss of a field sheet.

Personnel. The last names of crew members sampling or recording information on a plot.

Date. The date, listed in the following order: **year (yy) / month (mm) / day (dd),** using two digits for each.

Forest/District. This is a four letter code based on the first letter of the **National Forest** (Gifford Pinchot = G, Umpqua = U), and three letters from the **Ranger District** (e.g., Diamond Lake = DIL) (see T**able 1.—Forest/District Codes, Block Numbers, and Compass Declination Values**). Note, we will maintain the GRAN and GWIR codes despite recent changes in their designations.

Block. Each **Block** contains a complete set of six treatment units. Blocks are numbered from 1 to 8 (see **Table 2.— Forest/District Codes, Block Numbers, and Compass Declination Values**).

Treatment Unit. The ca. 13 ha **Treatment Units** (containing 64 grid points) are numbered from 1 to 6 within each Block. The number corresponds to the type of harvest treatment: 1 = 100% retention (control), 2 = 75% retention (gaps), 3 = 40% retention (dispersed), 4 = 40% retention (aggregated), 5 = 15% retention (dispersed), 6 = 15% retention (aggregated). This number will be the first number on the metal tag affixed to each grid-point center post.

Plot. The **Plot** number is also found on the metal tag affixed to each grid-point center. A 3-character identifier represents the **Treatment/Row Letter/Column No.** (e.g.,1A7 = Treatment 1, Row A, Column 7).

SAMPLING AND RECORDING DATA

- Before beginning work each day, be sure that the declination on your compass is set properly (see **Table 1.—Forest/District Codes, Block Numbers, and Compass Declination Values**).
- To minimize damage to vegetation within a plot, do not establish “camp” at the center of the plot; leave packs and eat lunch outside the circular tree plot. Sit/store gear on stumps/sound logs as much as possible to reduce soil disturbance.
- Always use the fine point mechanical pencil (0.5 mm HB lead) and separate eraser provided.
- Be sure that data are recorded in the units (e.g., cm, %) and with the precision (e.g., nearest cm or 0.1 cm) requested—column headings contain information on units; the style of the blank line indicates the precision. Thus, if there is a decimal point pre-printed on the data sheet, data are collected in tenths of units. If there is no decimal point, data should be collected in integer form.
- Do not put any extraneous marks (e.g., dashes, asterisks, or slashes) in the data columns. Be sure to write with dark characters: we will be making xerox copies of all forms and light handwriting will not reproduce. When erasing, erase completely, leaving no stray marks.
- Always use CAPITOL letters for species acronyms.

FORM U-A. GENERAL PLOT CHARACTERISTICS

Data to Record:

1. **General Comments About Plot:** Please comment liberally about overall plot conditions: levels and types of disturbance, forest stand features, and other noteworthy features of the ground surface, forest, or understory vegetation. If, for any reason, reinstallation of rebar or PVC is required, details should be reported here.
2. **Plot and transect locations**: Do not fill out this portion of the U-A form; it was done in 1998 or 1999.

Transect Orientations and Layout

Transect Orientations: The schematic figure at the bottom of Form U-A illustrates the orientation of Transects A-D relative to the permanent grid system. Transects should be oriented 45^{o} from the main grid system. Transect bearing by block and treatment unit are listed in **Table 3.—Transect Bearings**.

Note: on several occasions, transects within a treatment unit were incorrectly surveyed during pre-harvest sampling. We will maintain these "unconventional" orientations. Thus, be sure to consult Table 3 before beginning each plot. In addition, please consult the separate table entitled **DEMO Vegetation Transect Reestablishment Data** which contains the orientations of transects and the locations of beginning and end points, as well as possible intermediate points (see below).

Laying out Transect Lines: Always begin at Transect A. To reduce time and to minimize disturbance, all measurements should be completed at Transect A before moving on to Transect B.

Clip the zero mark of the tape onto the rebar located 4 m from the center of the plot (this is called the “4-m" point . . PVC covers each rebar). Next, unreel the tape to the other post located 6 m away (this is called the “10-m" point) keeping the tape as tight and as straight as possible. A tape may have to be run under and/or between logs and slash to keep it tight and straight. Your partner should sight along the tape to ensure that a straight, tight line is run. The loose end of the tape should then be clipped to the 10-m rebar. Remember to consult the listing entitled **DEMO Vegetation Transect Reestablishment Data** (not part of this field manual) which may contain information critical to establishing the transect line.

If large logs, trees, stumps, or slash piles fall along the transect line, intermediate PVC posts may have been established in front of and/or in back of these obstructions. The occurrence of all intermediate points are documented in the table entitled **DEMO Vegetation Transect Reestablishment Data**. Always consult this table before setting up the transect line. Similarly, logs and slash may force the placement of the 4-m or 10-m points at distances greater than or less than 4 and 10 m from plot center. Again, these situations will be documented in the table entitled **DEMO Vegetation Transect Reestablishment Data**. If the 4-m point is not located at 4 m, clip the tape to the rebar at the point along the tape that corresponds to the rebar location. For example, if the rebar is actually at 4.20 m, clip the tape at 4.20 m. This will greatly facilitate placement of microplot frames and other measurements.

If, after setting out the tape, the distance to the 10-m point differs from that listed in the **DEMO Vegetation Transect Reestablishment Data** by more than 10 cm, clip the tape at the new point, and be sure to make a note in the **Comments** field (e.g., “**10-m point actually at 10.17 m”**). If the difference is less than 10 cm, tighten or loosen the tape as necessary to make it conform to the distance listed.

When the "4-" and "10-m" PVC posts lie at distances other than 4 and 10 m, data should still be collected relative to the points where these posts would have been placed had there not been obstruction(s). When intermediate points are present, data collection may need to occur in segments by clipping the tape to these intermediate posts. In both instances, it is critical that you pay particular attention to the markings on the meter tape and add or subtract distances as necessary.

Please carry several pieces of rebar and PVC with you at all times to replace missing points or to establish new intermediate points if necessary.

FORM U-B2. HERB LAYER IN HARVESTED PLOTS: PRESENCE / ABSENCE AND NUMBERS OF TREE SEEDLINGS

Which Plots to Sample: All understory plots in the dispersed retention treatments (Units 3 and 5), but only harvested understory plots in the "gap" (Unit 2) and aggregated retention treatments (Units 4 and 6).

This form will be used to record herb-layer and tree seedling data in all plots that have been disturbed by harvest. Each transect requires a new field sheet, although more than one field sheet may be necessary per transect if the flora is diverse. If a continuation form is necessary, place a check mark in the **Cont.?** ____ field of the second data sheet. If no herbs or tree seedlings are present, complete the header information and place a check mark in the **Herbs/Tree Seedlings absent?** ____ field.

Vascular species in the herb layer include those species listed as grasses, sedges and rushes, ferns and fern allies, forbs, sub-shrubs, and low-shrubs in **Table 5.—Vascular Plant Species Codes and Growth-form Assignments**. The species listed in Table 5 were those found during pre-harvest sampling. Many additional weedy species will be present following harvest; these are not listed in Table 5.

Herb-layer species and tree seedlings are sampled in the same plots as the bryophytes and lichens (note, however, that the latter two groups will only be sampled in the Washington DEMO blocks). Remember, slash within the frame can be pushed gently to the side to make it possible to see the ground surface, but don't remove the slash from the microplot. All observations should be made from outside (i.e., the counterclockwise side) of the 1 x 6 m belt transect. To reduce damage to vegetation in the belt transect, the recorder should also stand outside this area. Cover estimates are made by leaning directly over the microplot.

Data to Record:

- **Total cover (%).** Estimate the total cover (vertical projection) of herb-layer species as a group. For cover values between 0 and 1%, estimate to the nearest 0.1%; for cover between 1 and 10%, to the nearest 1%; and for cover >10%, to the nearest 5%. If there are no herb-layer species present in a microplot, record the cover as 0.0%.

  Cover equivalents: 1 x 1 cm = 0.1% cover; 1 x 10 cm = 1.0% cover; 10 x 10 cm = 10% cover; 20 x 25 cm = 50% cover

- **Total no. of tree seedlings.** Record the total number of tree seedlings of all species in each microplot (see below instructions on tallying individual species). If no tree seedlings are found, record a zero (0).

- **Presence of individual herb-layer species.** List separately all herb-layer species present in the microplot. Write the full name in the **Species name** column, an "**H**" in the **LF** column, and the four or five letter **Species code** (see **Table 5.–Vascular Plant Species Codes and Growth-form Assignments**) in the next column. The full name makes it possible to correct an erroneous species code. Codes for species identified to the genus level should contain the first 5 letters of the genus name. For weedy species not listed in Table 5, consult Garrison et al. for the appropriate species code.

  Place a "1" in the **Present?** column to indicate presence in a microplot. Leave the **Present?** column blank if a species does not occur in a particular microplot. No data should be recorded in the **No. of tree sdl**. column.

A species that cannot be identified at the time of sampling should be coded as a unique unknown (e.g., UNKN1, UNKN2) and described in detail on the field sheet in the **Species name** column. Be sure to record an "**H**" in the **LF** column. A sample should be collected from an area outside the transect, and placed in a plastic bag labeled with the personnel, date, block, treatment, plot, transect and microplot number and same life form and unknown species code. Numbering of unknowns should begin anew for each plot, but not for

each transect within a plot. Thus, the code "**H UNKN1**" can refer to more than one herbaceous species within a treatment unit, but only to one herbaceous species within a plot. Do not reference an unknown in a plot to a sample from a previous plot instead of collecting a sample of the unknown. There must be a sample of a given unknown collected for every plot, even if the same unknown is collected in other plots. Please make sure to record on the collection bag/newspaper for pressing, all the transects and microplots within which the sample occurs (e.g., "**also found on Trans B, μp 1, 2; Trans C, μp 3"**). If the plant cannot be identified soon after collection in the field, it should be pressed and labeled for future identification.

An unidentifiable herb that possesses only cotyledons should be recorded as "**UNKN0**" [zero]. In the **Species name** column, record "**cotyledons only—not collected**"**.** Any other unidentifiable herbs for which samples cannot be collected should also be recorded as unknowns, described in the **Species name** column, and a note made that a reference sample was not taken (e.g., "unknown glabrous, opposite-leaved herb--not collected"). Reminder: please do not take samples from the transect.

- **No. of tree seedlings.** List all species of trees for which seedlings (< 10 cm tall) are rooted in the microplot. Write the full name in the **Species name** column, and the **life form** (T) and four or five letter **Species code** (see Table 5) in the two subsequent columns. Codes for species identified to the genus level should contain the first 5 letters of the genus name. Record the total number of seedlings rooted in the microplot in the column labeled **No. tree sdl.** No data should be recorded in the **Present?** column. A clump of hardwood stems < 10 cm tall arising from a common base at ground level—for example if a stem has been cut and resprouts with multiple stems—should be tallied as a single "individual". If no tree seedlings are present for an individual species, leave the **No. tree sdl**. column blank.

FORM U-B3. HERB LAYER IN UNCUT PLOTS: PLANT COVER, HEIGHT, AND NUMBERS OF TREE SEEDLINGS

Which Plots to Sample: All understory plots in the control treatment (Unit 1), all uncut understory plots in the "gap" treatment (Unit 2), and all understory plots in the retained patches of the aggregated retention treatments (Units 4 and 6).

This form will be used to record herb layer and tree seedling data in all plots that have remained undisturbed. Each transect requires a new field sheet, although more than one field sheet may be necessary per transect if the flora is diverse. If a continuation form is necessary, place a check mark in the **Cont.?** ____ field of the second data sheet. If no herbs or tree seedlings are present, complete the header information and place a check mark in the **Herbs/Tree Seedlings absent?** ____ field (this is not likely to occur in these forest plots).

Vascular species in the herb layer include those listed as grasses, sedges and rushes, ferns and fern allies, forbs, sub-shrubs, and low-shrubs in **Table 5.—Vascular Plant Species Codes and Growth-form Assignments**. Some additional weedy species may invade from harvested areas; these are not listed in Table 5.

Herb-layer species and tree seedlings are sampled in the same plots as the bryophytes and lichens (note, however, that the latter two groups will only be sampled in the Washington DEMO blocks). All observations should be made from outside (i.e., the counter-clockwise side) of the 1 x 6 m belt transect area. To reduce damage to vegetation in the belt transect, the recorder should also stand outside this area. Cover estimates are made by leaning directly over the microplot.

Data to Record:

- **Total cover (%).** Estimate the total cover (vertical projection) of herb-layer species as a group. For cover values between 0 and 1%, estimate to the nearest 0.1%; for cover between 1 and 10%, to the nearest 1%; and for cover > 10%, to the nearest 5%. If there are no herb-layer species present in a microplot, record the cover as 0.0%.

  Cover equivalents: 1 x 1 cm = 0.1% cover; 1 x 10 cm = 1.0% cover; 10 x 10 cm = 10% cover; 20 x 25 cm = 50% cover

- **Total herb height (cm).** The height recorded for total herbs should correspond to the tallest plant in the microplot (see height measurements below).

- **Total no. of tree seedlings.** Record the total number of tree seedlings of all species in each microplot (see below instructions on tallying individual species). If no tree seedlings are found, record a zero (0).

- **Cover and height of individual herb-layer species.** List separately all herb-layer species present in the microplot. Write the full name in the **Species name** column, and the **life form** (H) and four or five letter **Species code** (see Table 5) in the two subsequent columns. The full name makes it possible to correct an erroneous species code. Codes for species identified to the genus level should contain the first 5 letters of the genus name. For weedy species not listed in Table 5, consult Garrison et al. for the appropriate species code.

  For each species estimate the **cover** (vertical projection within the plot) and the **maximum height** (foliage or inflorescence) in centimeters. Due to overlap among species, the individual covers of species can sum to greater 100% (and can thus be greater than **Total cover (%)**, whose maximum is 100%). However, the sum of the individual species covers should at least be equal to **Total cover (%)**.

  Height should be estimated within the vertical planes defined by the microplot boundaries and should be measured as the vertical projection to the ground surface, not as stem length. For plots in which the substrate is log or stump, height should be measured from the rooting substrate. Taxa essentially flat with

ground surface should be assigned a height of 1 cm. Otherwise, maximum heights (foliage or inflorescence) should be estimated to the nearest centimeter for individuals < 50 cm tall, and to the nearest 5 cm for taller plants. It is easiest if each species' height is measured and recorded at the same time cover is estimated.

A species that cannot be identified at the time of sampling should be coded as a unique unknown (e.g., UNKN1, UNKN2) and described in detail on the field sheet in the **Species name** column. Be sure to record an "**H**" in the **LF** column. A sample should be collected from an area outside the transect, and placed in a plastic bag labeled with the date, personnel, block, treatment, plot, transect, and microplot number and same life form and unknown species code. Numbering of unknowns should begin anew for each plot, but not for each transect within a plot. Thus, the code "**H UNKN1**" can refer to more than one herbaceous species within a treatment unit, but only to one herbaceous species within a plot. Do not reference an unknown in a plot to a sample from a previous plot instead of collecting a sample of the unknown. There must be a sample of a given unknown collected for every plot, even if the same unknown is collected in other plots. Please make sure to record on the collection bag/newspaper for pressing, all the transects and microplots within which the sample occurs (e.g., "**also found on Trans B, μp 1, 2; Trans C, μp 3"**). If the plant cannot be identified soon after collection in the field, it should be pressed and labeled for future identification.

An unidentifiable herb that possesses only cotyledon leaves should be recorded as an unknown (UNKN#). In the Species name column, record "**cotyledons only—not collected**". Any other unidentifiable herbs for which samples cannot be collected should also be recorded as unknowns, described in the **Species name** column, and a note made that a reference sample was not taken (e.g., "**unknown glabrous, opposite-leaved herb--not collected**").

Reminder: please do not take samples from the transect.

- **No. of tree seedlings.** List all species of trees for which seedlings (< 10 cm tall) are rooted in the microplot. Write the full name in the **Species name** column, and the **life form** (T) and four or five letter **Species code** (see Table 5) in the two subsequent columns. Codes for species identified to the genus level should contain the first 5 letters of the genus name. Record the total number of seedlings rooted in the microplot in the column labeled **No. tree sdl.** No data should be recorded in the **Present?** column. A clump of hardwood stems < 10 cm tall arising from a common base at ground level—for example if a stem has been cut and resprouts with multiple stems—should be tallied as a single "individual". If no tree seedlings are present for an individual species, leave the **No. tree sdl**. column blank.

FORM U-C. GROUND SURFACE CONDITIONS IN INTACT FOREST

Which Plots to Sample: All understory plots in the control treatment (Unit 1), all unharvested understory plots in the "gap" treatment (Unit 2), and all understory plots in the retained patches of the aggregated retention treatments (Units 4 and 6).

This form will be used to record the ground surface conditions in all plots that have remained undisturbed. Each plot requires only one field sheet.

Ground surface characteristics are sampled using the same 0.2 x 0.5 m microplots (Daubenmire plots) used to sample the cryptogams and herb-layer species and should be sampled at the same time as these.

Data to Record:

- **Cover.** As with the herb layer, cover estimates of all ground surface conditions are determined by leaning directly over the microplot. For cover values between 0 and 1%, estimate to the nearest 0.1%; for cover between 1 and 10%, to the nearest 1%; and for cover >10%, to the nearest 5%.

  Cover equivalents: 1 x 1 cm = 0.1% cover; 1 x 10 cm = 1.0% cover; 10 x 10 cm = 10% cover; 20 x 25 cm = 50% cover

Definitions of ground surface conditions:

Mineral soil = bare ground without appreciable surface litter or duff. This includes mineral soil, gravel or cobbles that are < 7 cm in the narrowest dimension, and organic/mucky soils.

Stone = individual pieces of rock or bedrock > 7 cm in the narrowest dimension, or contiguous smaller pieces that form a surface > 7 cm in the narrowest dimension.

Fine litter = leaves (no matter how large), needles, moss, fallen canopy lichens, or small **branches** ≤ 5 cm in diameter.

Coarse litter = branches, tree boles, rootwads, ***natural*** "stumps" or snags, or bark, all of which are greater than > 5 cm in the smallest dimension; or contiguous smaller pieces of wood or bark that form a surface > 5 cm in the narrowest dimension.

Stump = previously or newly *cut* stump.

Live tree or shrub base/root = base, buttress, or exposed roots of a live tree or shrub.

Other = enter a unique, descriptive code and define in the margin of the data form (e.g., SNAG [snag base]). Limit the use of **Other** to situations in which the standard surface types are not appropriate.

Notes: For each microplot, the cover of mineral soil + stone + fine litter + coarse litter + stump + live tree base/root + other should equal 100%, EXCEPT if a piece of coarse litter (e.g., a log) is suspended or elevated over mineral soil, stone, or fine litter within the plot—then the total can exceed 100% by the amount of that overlap. If this occurs, make a note in the margin: "**>100%, log elev.**" Multiple layers of logs should not be tallied any differently from multiple layers of foliage; thus cover of coarse litter (or any other single category) should never exceed 100%. Note: If the ground surface beneath plants cannot be seen, it should be considered to be fine litter. If a microplot lies under water (e.g., a stream or other wet spot), comment as such on the U-A form, but record substrates as if the water were absent.

FORM U-D. TALL SHRUBS and UNDERSTORY TREES: COVER AND HEIGHT

Which Plots to Sample: All understory plots in all treatment units.

A modified version of the line intercept method will be used to estimate the cover and foliage height of species in the tall shrub and understory tree (< 5.0 cm dbh) layer (**Fig. 3.—Line Intercept Methodology**).

Each transect requires a new field sheet, although more than one field sheet may be necessary. If a continuation form is necessary, place a check mark in the **Cont.?** ____ field of the second data sheet. If no tall shrub or understory trees are present, complete the header information and place a check mark in the **Shrubs/trees absent?** ___ field.

As with herb layer measurements, line intercept estimates should be made from the counterclockwise side of the 1 x 6 m belt transect area (the recorder should also stand outside this area). Cover of each tall shrub and understory tree species is determined by estimating the total portion of the 6-m long transect tape that intercepts its canopy. Cover is determined for all species that are considered to be tall shrubs or understory trees (see **Table 5.— Species Codes and Growth-form Assignments**), irrespective of height or whether the plant lies above or below the meter tape. **Note:** cover of foliage from any tree with a diameter ≥ 5 cm dbh should not be sampled.

On each line of the field sheet, there is room to enter five pairs of "**Start**" and "**End**" measurements per species. If additional pairs of measurements are necessary, simply repeat the species name and code on another line and increment the **LC** (line count) value by one.

Data to Record:

- **Cover (start and end points).** For each species, record the **Species name**, life form (**LF,** i.e. TS = tall shrub, HT = hardwood tree, CT = conifer tree), **Species code**, and a "1" in the **LC** (line count) column. Record the beginning (Start) and ending (End) meter mark intersected by each segment of the tall shrub or tree canopy that projects down to the meter tape (or up to the meter tape for prostrate stems) (see **Fig. 3.—Line Intercept Methodology**). Record these start and end points to the nearest 0.01 m (1 cm), but do not spend a lot of time attempting to resolve small gaps in cover between leaves or branches; measurements should represent the general outline of the canopy. If two or more plants of the same species overlap, record the beginning and ending meter marks that represent the species as a whole, not the individual plants (**Fig. 3.—Line Intercept Methodology**).

A species that cannot be identified at the time of sampling should be coded as a unique unknown (e.g., UNKN1, UNKN2) and described in detail on the field sheet in the **Species name** column. Be sure to record the life form as well (TS = tall shrub, HT = hardwood tree, CT = conifer tree) in the **LF** column. A sample should be collected from an area outside the transect (include stem, leaves, and flowers/fruits if possible), labeled with the date, personnel, block, plot, transect number and same unique species code, and temporarily placed in a plastic collecting bag for subsequent identification. If the plant cannot be identified soon after collection in the field, it should be pressed and labeled for future identification. **Note:** A note should also be made on the collection bag or newspaper that the specimen was a tall shrub or tree recorded on the U-D form.

- **Total cover of tall shrubs, hardwoods and conifers (start and end points)**. The "**Start**" and "**End**" points for the broader groupings of **Total Tall shrub (SHRUB), Total hardwood tree (HARDW),** and **Total conifer tree (CONIF)** can be determined coincidentally with, or after the canopies of the individual species are recorded. Simply treat all plants within each of these categories as if they belonged to the same "species" and record the "Start" and "End" points accordingly (see **Fig. 3.—Line Intercept Methodology**). If one or more of these growth-forms is absent from a transect, leave all columns blank.

Maximum height. For each meter-long interval of the transect line (0.00-1.00, 1.01-2.00, 2.01-3.00 m, etc.) record the **Species name**, Lifeform (**LF**), **Species code**, and **Maximum height** (of foliage or

inflorescence) of each tall shrub or understory tree species present within that interval along the transect line. The maximum value for **SHRUB, HARDW,** and **CONIF** will correspond to the largest value among the species within that growth form within the meter-wide interval in question. Be sure that maximum heights are recorded in the appropriate meter-wide intervals.

Heights should be estimated to the nearest 0.1 m for individuals < 3 m tall and to the nearest 0.5 m for plants > 3 m tall.

As with the herb layer, height is measured as the vertical projection to the ground surface—it is not a measure of stem length.

If the meter tape has to be run in sections between intermediate rebars (because of large trees, logs, stumps, or slash that obstruct the tape line), or if the end points do not lie at 4 or 10 m, it is not absolutely critical that the true start and end distances from the initial rebar are recorded (as only the distances between points are used in the calculation of cover). It is critical however, that data are collected between 4.0 and 10.0 m from the plot center. As a result, some sampling may be necessary before the "4-m" PVC post and some beyond the "10-m" PVC post (e.g., if the "4-m" PVC must be placed at 4.50 m or the "10-m" PVC at 9.70 m). This will require that you pay particular attention to the markings on the meter tape and add or subtract distances as necessary. If, for any reason, the distances recorded on the U-D form are not “true” distances from the 4.0 m PVC post, place a check mark in the **“Start and end points are not “true” distances ____?”** field.

FORMS U-G and U-G2. PLANTED TREES

Note to year 2000 crew: The only location where planted trees will be sampled for the first time is Capitol Forest, Treatment Unit 3 (using **Form U-G**); a total of 32 plots will be sampled (same plots as those in which understory measurements were taken). In all other Blocks x Treatment Units, planted trees will already be tagged and remeasurements/mortality checks will be done (using **Form U-G2**).

This task should be undertaken only after all sampling of transect lines in completed. As you establish the boundaries of these plots and search for planted trees, avoid walking through the belt transects that define the areas sampled for understory vegetation

Which Plots to Sample: All plots that are sampled for understory vegetation in the dispersed retention treatments (Units 3 and 5), and all harvested plots sampled for understory vegetation in the gap (Unit 2) and aggregated retention (Units 4 and 6) treatments.

One form will probably be sufficient to record all planted trees within a plot.

FORM U-G (Planted Trees: Initial tagging and first-time measurements)

Planted trees will be tagged and measured in all harvested plots. All planted trees will be tagged within the 0.04 ha circular plots used to sample overstory trees (see **Fig 1.—Plot Layout**). The boundary of the 0.04 ha tree plot (horizontal radius of 11.28 m) should be flagged with blue and white striped flagging to identify both planted and overstory trees that are "in" or "out" of the plot. From the center post, measure out as many plot radii as necessary to evaluate borderline trees. On sloping terrain, make distance corrections for slope (using your clinometer) along each radius using the slope corrected radii values listed in **Table 4.—Slope Corrected Distances**. Note that slope-corrected distances may vary for different radii within a plot depending on the topography.

Once the plot boundary is defined, systematically search the entire plot for planted trees (several species of planted trees are possible at a site). Planting densities will vary among blocks (as planned) and from plot to plot (by chance); however, on average you should encounter ~10-12 trees per plot.

Data to Record:

Around the base of each planted tree, place a uniquely numbered metal tag on a piece of green tie-tape—these tags will eventually have to be placed on side-branches so as not to girdle the trees. If the planted tree is dead, do not tag it, but proceed with the remaining tasks. Record the:

- **Quarter** location (see diagram at the bottom of the U-A form)
- **Tag number**
- **Species code**
- **Height** (total height from the base of the tree, in centimeters); use the calibrated PVC post to measure from the ground surface along the main axis of the tree; gently straighten the leader if it is bent. If the terminal leader is gone or damaged, wrap your hand around the top whorl of branches and pull all the laterals up to determine which is the longest—then measure to the tip of the longest lateral.
- **Leader Growth** (current year's growth): use a ruler and measure to the nearest 0.1 centimeter; gently straighten the leader if it is bent. If the terminal leader is gone or damaged, wrap your hand around the top whorl of branches and pull the laterals up to determine which is the longest; then measure the length of the longest lateral. Do not measure leader growth if the tree is dead.
- **Vigor:** 1= good (no apparent signs of distress); 2 = fair (some signs of stress); 3 = poor (extreme distress apparent, death imminent); 6 = dead.
- **Comments:** e.g., reasons for vigor codes different from 1.

In the unlikely event that no planted trees can be found, complete the header information and place a check mark in the **Planted trees absent?** ____ field.

FORM U-G2 (Remeasurement of Planted Trees)

For all trees that have already been tagged, record the following data in the blanks provided:

- **New tag number:** only if necessary (see ** below)
- **Current height** (total height from the base of the tree, in centimeters); use the calibrated PVC post to measure from the ground surface along the main axis of the tree; gently straighten the leader if it is bent. If the terminal leader is gone or damaged, wrap your hand around the top whorl of branches and pull all the laterals up to determine which is the longest—then measure to the tip of the longest lateral.
- **Leader Growth** (current year's growth): use a ruler and measure to the nearest 0.1 centimeter; gently straighten the leader if it is bent. If the terminal leader is gone or damaged, wrap your hand around the top whorl of branches and pull the laterals up to determine which is the longest; then measure the length of the longest lateral. **Do not take this measurement if the tree is dead.** If there has been no leader growth or this year's leaders have been browsed, record a value of 0.0 and note as such in the comments. If the leader growth you measure is for a lateral branch, record in the comments: "Leader growth is for lateral branch"
- **Current Vigor:** 1= good (no apparent signs of distress); 2 = fair (some signs of stress); 3 = poor (extreme distress apparent, death imminent); 6 = dead.
- **Comments:** regarding tree condition (e.g., browsing, pathogens, apparent cause of death, etc.). If tree is dead, be sure to add the comment "**Dead**".

** If, for some reason, a live planted seedling is found without a tag, two possibilities exist. The pre-printed data on **Form U-G2** can be used to determine what has happened:

- The tree had been tagged but the tag has been lost: First, see if there is a tag number listed on **Form U-G2** that has not been found. If there is, AND if after carefully searching you cannot locate this tagged tree on the plot, AND the location, species, and size of the untagged tree seem to match those listed, it may be that this tree has simply lost its tag. If you are fairly certain that this is the missing tree, a new tag number may be placed on the seedling (as described above). The new tag # should be recorded in the **New Tag #** column, and a note made in the **Comments** field as follows: "Old tag # ___ missing".

- The tree was never tagged during the initial measurement: It may be that the tree you have found was inadvertently missed during the initial sampling/tagging. If all the tag numbers on **Form U-G2** have been accounted for, and you are absolutely sure that the tree in question was planted (i.e., that it is not natural/advanced regeneration), follow the procedures outlined above for **Form U-G**, penciling in the new information at the bottom of **Form U-G2**. In this situation, current height **should NOT** include the current year's leader growth; instead it should be a measure of total height in 1998 (for Block 5) or in 1999 (for Blocks 1, 4, 6, 7, 8)—you can use whorls to count back in time. This year's leader growth should be recorded in the **Leader growth** column. If you have found a planted, untagged tree in Block 5 (highly unlikely, but possible) in addition to last year's leader growth record the 1998-1999 leader growth as a comment (i.e., "1998-1999 leader growth = __.__ ").

FORM 0-A. OVERSTORY TREES
(YEAR 2000: FOR REFERENCE ONLY, NOT TO BE SAMPLED)

Which Plots to Sample: : All overstory plots in all treatment units—that is, 32 plots in Units 1 and 2, all 64 plots in Units 3 and 5, 37 plots in Unit 4, and 32 plots in Unit 6.

Each plot requires a new field sheet. If it is necessary to use a second page, place a check mark in the **Cont.?** ____ field of the second data sheet. If there are no trees to sample, complete the header information and place a check mark in the **Trees absent?** ____ field.

All overstory trees within a circular plot of 0.04 ha (11.28 m radius) should be tagged and measured (see **Fig. 1—Plot Layout**). All species that qualify as overstory trees are listed in the Understory Hardwood and Conifer sections of **Table 5.—Vascular Plant Species Codes and Growth-form Assignments**.

All overstory trees within the 0.04 ha circular tree plot will be individually tagged and measured (see **Fig. 1—Plot Layout**). For plots that have not been harvested, where trees are relatively dense, the boundary of the plot (horizontal radius of 11.28 m) should first be flagged with blue and white striped flagging to identify trees that are "in" and "out" of the plot. Determination of "in" or "out" trees should be based on the position of the center of the tree at breast height. For trees that are leaning, "in" or "out" should be based on the position of the center of the tree at ground level. On sloping terrain, make distance corrections for slope (using your clinometer) along each radius using the slope corrected radii values listed in **Table 4.—Slope Corrected Distances**. Note that slope corrected distances may vary for different radii within the plot depending on the topography. To mark the plot boundary, hang blue and white striped flagging on the branches of trees or shrubs, or on sticks inserted in the ground. Where tree density is high, it may be necessary to measure out to individual trees to determine positions relative to the plot boundary. It is critical that “in” and “out” determinations are done accurately, as these trees will form the permanently tagged population sampled in all future measurements.

Upon completing overstory sampling, all blue and white striped flagging should be removed from the plot. As you establish and sample the overstory plot, avoid walking through the belt transects that define the areas sampled for understory vegetation.

All trees $\geq$ 5 cm dbh should be tagged and measured. Prior to tagging trees, determine where standard breast height (1.37 m) falls on your vest and mark it permanently with a metal binder clip. The nail and tag should be placed at exactly 1.37 m from the ground surface as measured from the **up-slope** side of the tree (for odd situations, such as split or swollen boles, see **Fig. 4.—Standards for Measuring Diameters of Trees**). However, the tag should always be placed so that it faces the plot center. Measurements are taken to the nearest 0.1 cm with the tape just above the nail and perfectly level with the cross section of the bole (have your recorder observe tape placement on each tree).

Trees should be tagged systematically, quarter by quarter. Note that snags and live trees can be tagged simultaneously. When a snag is encountered in the process of tagging live trees, record in the **Comments** field of the last live tree tagged that the next tag # is a snag (e.g., for tree #4234 record in the **Comments** field: “**Tag #4235 is a snag.**” This way, a “missing tag number” in the live tree series is accounted for in the comments.

Data to record:

- the **Quarter** location (see schematic figure on Form U-A),
- the unique **Tag number**
- **Species code**
- **DBH** (in centimeters)
- **Canopy class,** a simple classification that ranks species by their relative position in the canopy.
  --- ***Dominant*** trees are those that emerge from the general canopy layer, and thus receive light from the top and sides;

--- ***Co-dominant*** trees are those that form the main canopy; the crown extends to the top of the general canopy layer, and so receives light from the top, but not much from the sides
--- ***Intermediate*** trees are shorter than co-dominants; the crown extends into the lower portion of the general canopy layer and thus receives mostly filtered light from the top and sides.
-- ***Suppressed*** trees are the shortest individuals that form the lowest tree layer. The crown is completely beneath the general canopy layer. Contrary to their name, they are not necessarily any more stressed than trees in any other layer.

Note: this classification scheme was devised for closed canopy forests and has limited relevance both in the dispersed retention units (where dominant and codominant trees were retained by design) or in the harvested matrix of the aggregated retention units where only suppressed (and perhaps some intermediate) trees were left if they were not merchantable. Base your determinations of canopy class in the dispersed retention units on the relative heights of trees. Trees left in the harvested matrix of the aggregated retention treatments should be residual suppressed or intermediate class trees—use trees of comparable height in adjacent retention patches to make your determinations.

- **Vigor:** a qualitative ranking of tree health:
  -- ***Good*** (1) = no apparent signs of distress
  -- ***Fair*** (2) = some signs of distress apparent (e.g., discolored foliage, paucity of leaves)
  -- ***Poor*** (3) = extreme distress apparent (i.e., death imminent)
- **Conditions:** A series of crown, bole and disturbance condition codes can be recorded for each tree (see field form). As many as three codes can be entered to describe crown and bole conditions and two codes to describe disturbance.

It is critical that the tagging, measuring and characterization of tree conditions are done with care, as these data will serve as the baseline for all future measurements. The recorder should watch for missed trees, incorrect species identification, and incorrect placement of the diameter tape, and should aid in assigning **Condition** codes.

Special Note to 1999 Crews: As you tag trees at Watson Falls, Dog Prairie, and Little White Salmon, please note the occurrence of any tree that appears to have fallen during the past winter (foliage is likely to be green). These will not be captured in our first-year (year 2000) assessment of mortality of tagged trees so it is important to note their presence now. For all trees that had been rooted in the plot but are now either down/dead or (2) snapped/dead record the following information on the U-A form:

- **Quarter**
- **Species code**
- **DBH:** approximate DBH location if necessary
- **Canopy class:** estimate if necessary
- **Vigor:** 6 **=** dead
- **Comment:** Please comment on the (1) cause of mortality (e.g., "uprooting, "stem breakage," or "co-opted uprooting") and (2) direction of uprooting or stem breakage (degrees).

Please do not tag these trees.

Form O-B. SNAGS
(YEAR 2000: ONLY DONE FOR NEW CASES OF MORTALITY i.e., if you fill out an O-D FORM])

Which Plots to Sample: All overstory plots in all treatment units—that is, 32 plots in Units 1 and 2, all 64 plots in Units 3 and 5, 37 plots in Unit 4, and 32 plots in Unit 6.

There should be sufficient room on a field sheet to record the characteristics of all snags within a plot. If no snags are present, complete the header information and place a check mark in the **Snags absent?** ____ field.

Snags and natural stumps should be sampled on a circular plot of 0.08 ha area (radius of 15.96 m) centered on each overstory tree plot (see **Fig. 1.–Plot Layout**). Snags and natural stumps must be ≥ 0.5 m tall and ≥ 25 cm dbh to be sampled. (If a snag or stump is < 1.37 m tall, diameter is measured at 0.5 m height). Note: Snags can include recently tagged trees that have died: be sure to record the necessary information on both the O-B and O-D forms.

A snag need not be "rooted" in the ground: it may be leaning or partially windthrown with an exposed rootwad.

If snags and stumps are uncommon, measure distances as needed to determine if they fall within the plot. If they are numerous, flag the plot boundaries accounting for slope as described for the overstory tree plot.

Note that snags and live trees can be tagged simultaneously (see description above for Form O-A).

Data to Record:

- the **Quarter** location (see schematic figure on Form U-A
- the unique **Tag number** nailed at breast height if possible. If a tag can only be nailed at the base, do so and record the following in the **Comments** column: "**tagged at base.**" If the snag has to be tagged somewhere else, record the height of the tag as follows in the **Comments** column: **"tagged at ___ cm."** If the snag is too decayed to hold a tag, do not attempt to tag it, and simply record the following in the **Comments** column: **"no tag—too decayed.**"
- **Species code**, if identifiable (otherwise code as UNKN). See Table 5 for species codes.
- **DBH** (in centimeters): If a snag or stump is <1.37 m tall, measure the diameter at 0.5 m height and record in the **Comments** column **"measured at 0.5 m.**" If a snag is missing a significant portion of its volume and is concave in cross section, measure DBH by wrapping the tape around the "bole" in the normal fashion, but record in the **Comments** column: "**concave in shape.**"
- **Height (length) class** (see field sheet for coding: 1 = 0.5 - 1.5 m, 2 = > 1.5 - 5 m, 3 = > 5 - 15 m, 4 = > 15 m). For leaning snags, record the length of the snag, not the height of the tip off the ground.
- **Decay class** (see field sheet for coding and **Fig. 5.—Log and Snag Decay Classes**): For a given snag, the sets of parameters used to describe its state of decay may not always be consistent with the descriptions on the field sheet or the diagrams in Fig. 5. You may have to decide which description, on the whole, best fits the condition of the snag. In such cases use the decay class that best describes the **bole characteristics** of the snag.
- **Origin**: For natural snags, leave blank. If snag was created during harvest operations, record "**W**" (for Wildlife tree) and record in the **Comments** column: "**created wildlife snag**" As described above, ca. 6.5 trees per hectare have been left in all harvested portions of each treatment unit and have been topped or girdled to create replacement snags for those lost during harvesting.
- **Angle of lean** from vertical (in degrees, but only if >15^{o}): use a clinometer to measure the lean (only if >15 degrees) and be sure to read the degree scale (on the left), not the percentage (%) scale (on the right). On steeply sloping terrain, lean angle can exceed 90 degrees if trees are leaning down slope.

FORM O-D. TREE MORTALITY

Which Plots to Sample: : All overstory plots in all treatment units—that is, 32 plots in Units 1 and 2, all 64 plots in Units 3 and 5, 37 plots in Unit 4, and 32 plots in Unit 6.

Depending on the levels of mortality, one or more plots worth of data can fit on a mortality form. If it is necessary to use a second page for a plot, place a check mark in the **Cont.?** ____ field of the second data sheet. If there are no dead tagged trees, record the **Plot** number and record in the **Comments** field "**no dead trees**".

Every tagged overstory tree should be visited within a plot—use the data listing entitled **"DEMO Post-harvest tree list--2000"** to guide your search for all tagged trees. Trees are sorted by quarter then tag number. As you find each tagged tree and determine whether it is alive or dead, place a check mark in the blank in the left column of the data listing. If the tree is alive, nothing more needs to be done. If the tree is dead, various data need to be recorded that describe the condition and possible cause of mortality. (**Note**: if a dead tree is found that does not have a tag one can assume that it was dead at the time that trees were initially tagged; however, if not all of the tagged trees listed can be found in a plot, you may need to reconsider this assumption—a tag may have fallen off a dead tree).

For each case of mortality the following data need to be recorded:

- **Plot**
- **Qtr**
- **Tag no.**
- **Species**
- **DBH** (cm)
- **Canopy class**: this can be copied from the "DEMO Post-harvest Tree List--2000"
- **Remaining crown (%)**: see illustration on data form. Determinations are based on the main stem, not on the proportion of branches remaining.
- **Remaining tree (%)**: see illustration on data form. Determinations are based on the main stem, not on the proportion of branches remaining.
- **Lean angle** (deg): as recorded for snags. On steeply sloping terrain, lean angle can exceed 90 degrees if trees are leaning down slope.
- **Tree position:** see **Tree Position Codes** at bottom of data form
- **Direction of uprooting** (deg): only if tree has been uprooted or snapped; otherwise blank. If snapped, direction is from the remaining portion of bole to the top of the downed piece.
- **Tree condition codes**: up to 6 codes can be entered to describe the physical attributes of the tree including disease and damage conditions (see **Tree condition codes** at bottom of data form). When scarring of bole has occurred, please comment on type/location.
- **Comments**: in the separate section entitled **Comments** repeat plot and tag number, and describe the physical conditions of the tree and the apparent circumstances of mortality. Here are some examples: "Suppressed individual died standing with dead needles, fine branches present"; "Windthrown/uprooted, green needles present"; "Co-opted windthrow—knocked over/crushed by large windthrown PSME #567.

Note: Be sure that for each O-D case, an O-B record is made on an "O-B Snag form" if the dead tree meets the criteria used for classification of snags: ≥ 0.5 m tall, ≥ 25 cm dbh, and not prone.

Note: A new O-B form must be used for each plot. See O-B instructions above, for filling out the O-B form. If a tree has completely snapped creating a new snag, the data recorded on the O-B form should pertain only to the rooted portion of the dead tree. If the tree snapped below the tag, the tag should be removed from the bole and placed on the rooted portion of the dead tree.

WHEN SAMPLING IS COMPLETED BE SURE THAT YOU:

- have all the equipment that you arrived with as well as all plant samples,
- remove all blue and white striped flagging from the plot,
- record additional plot-level comments on form U-A, and
- complete a thorough check of all data forms for the plot. It is absolutely critical that both the recorder and measurer carefully proof all forms before leaving the plot. Be sure that the total number of pages is recorded on each data form.
- have collected and labeled all unknowns from the plot. If a sample was not collected for a particular microplot, be sure that this is indicated on the data form.

TABLES AND FIGURES FOR FIELD MANUAL

TABLE 1. FOREST/DISTRICT CODES, BLOCK NUMBERS, AND COMPASS DECLINATION VALUES

Forest / Ranger District	Block No.	Block Name	Block Code	Declination (deg)	Comments
Umpqua National Forest					
Diamond Lake RD	1	Watson Falls	UDIL	18.5 E	
North Umpqua RD	2	Little River	UNOU	20.0 E	
Cottage Grove RD	3	Layng Creek	UCOG	20.5 E	
Diamond Lake RD	4	Dog Prairie	UDOG	18.5 E	magnetic anomaly exists, questionable compass readings
Gifford Pinchot National Forest					
Cowlitz Valley RD	5	Butte	GRAN	20.0 E	formerly Randle RD
Mt. Adams RD	6	Little White Salmon	GMTA	20.0 E	
Mt. St. Helens NVM	7	Paradise Hills	GWIR	20.0 E	formerly Wind River RD
Washington Dept. of Natural Resources					
Capitol State Forest	8	Capitol Forest	CFOR	19.0 E	

TABLE 2. GRID SYSTEM BEARINGS

Convention: 1st azimuth = bearing from A1 to A7 (across rows); 2nd azimuth = bearing from A1 to G1 (down columns).

Treatment Number

BLOCK	1	2	3	4	5	6
UDIL 1	113°,203°	56°,146°	128°,218°	105°,195°	49°,139°	56°,146°
UNOU 2	180°,270°	154°,244°	85°,175°	86°,176°	85°,175°	20°,110°
UCOG 3	73.5°,163.5°	317°,47°	17.5°,107.5°	109.5°,199.5°	90°,180°	73.5°,163.5°
UDOG 4	120°,210°	115°,205°	90°,180°	115°,205°	120°,210°	90°,180°
GRAN 5	45°,135°	45°,135°	0°,90°	45°,135°	45°,135°	55°,145°
GMTA 6	231°,321°	280°,10°	226°,316°	316°,46°	236°,326	279°,9°
GWIR 7	310°,40°	90°,180°	245°,335°	349°,79°	82°,172°	348°,78°
CFOR 8	250°,340°	268°,358°	147°,237°	86°,176°	73°,163°	248°,338°

TABLE 3. TRANSECT BEARINGS

BLOCK		Transect	Treatment 1	2	3	4	5	6
UDIL 1	Watson Falls	A	68.5	11.5	83.5	60.5	4.5	11.5
		B	158.5	101.5	173.5	150.5	94.5	101.5
		C	248.5	191.5	263.5	240.5	184.5	191.5
		D	338.5	281.5	353.5	330.5	274.5	281.5
UNOU 2	Little River	A	46.5	20.5	41.5	42.5	41.5	66.5
		B	136.5	110.5	131.5	132.5	131.5	156.5
		C	226.5	200.5	221.5	222.5	221.5	246.5
		D	316.5	290.5	311.5	312.5	311.5	336.5
UCOG 3	Layng Creek	A	28.5	2	62.5	64.5	45	28.5
		B	118.5	92	152.5	154.5	135	118.5
		C	208.5	182	242.5	244.5	225	208.5
		D	298.5	272	332.5	334.5	315	298.5
UDOG 4	Dog Prairie	A	75	70	45	70	75	45
		B	165	160	135	160	165	135
		C	255	250	225	250	255	225
		D	345	340	315	340	345	315
GRAN 5	Butte	A	0	90	45	90	0	10
		B	90	180	135	180	90	100
		C	180	270	225	270	180	190
		D	270	0	315	0	270	280
GMTA 6	Little White Salmon	A	6	55	1	1	6	54
		B	96	145	91	91	96	144
		C	186	235	181	181	186	234
		D	276	325	271	271	276	324
GWIR 7	Paradise Hills	A	85	45	20	34	37	33
		B	175	135	110	124	127	123
		C	265	225	200	214	217	213
		D	355	315	290	304	307	303
CFOR 8	Capitol Forest	A	25	43	12	41	28	23
		B	115	133	102	131	118	113
		C	205	223	192	221	208	203
		D	295	313	282	311	298	293

TABLE 4. SLOPE CORRECTED DISTANCES

Slope (%)	Conversion factor	Radius of 0.01 ha tree plot	Radius of 0.04 ha tree plot	Radius of 0.08 ha snag plot	Slope (%)	Conversion factor	Radius of 0.01 ha tree plot	Radius of 0.04 ha tree plot	Radius of 0.08 ha snag plot
0	1.000	5.64	11.28	15.96	76	1.256	7.08	14.17	20.05
1	1.000	5.64	11.28	15.96	77	1.262	7.12	14.24	20.14
2	1.000	5.64	11.28	15.96	78	1.268	7.15	14.31	20.24
3	1.000	5.64	11.29	15.97	79	1.274	7.19	14.38	20.34
4	1.001	5.64	11.29	15.97	80	1.281	7.22	14.45	20.44
5	1.001	5.65	11.29	15.98	81	1.287	7.26	14.52	20.54
6	1.002	5.65	11.30	15.99	82	1.293	7.29	14.59	20.64
7	1.002	5.65	11.31	16.00	83	1.300	7.33	14.66	20.74
8	1.003	5.66	11.32	16.01	84	1.306	7.37	14.73	20.84
9	1.004	5.66	11.33	16.02	85	1.312	7.40	14.80	20.95
10	1.005	5.67	11.34	16.04	86	1.319	7.44	14.88	21.05
11	1.006	5.67	11.35	16.06	87	1.325	7.48	14.95	21.15
12	1.007	5.68	11.36	16.07	88	1.332	7.51	15.03	21.26
13	1.008	5.69	11.37	16.09	89	1.339	7.55	15.10	21.37
14	1.010	5.70	11.39	16.12	90	1.345	7.59	15.18	21.47
15	1.011	5.70	11.41	16.14	91	1.352	7.63	15.25	21.58
16	1.013	5.71	11.42	16.16	92	1.359	7.66	15.33	21.69
17	1.014	5.72	11.44	16.19	93	1.366	7.70	15.40	21.80
18	1.016	5.73	11.46	16.22	94	1.372	7.74	15.48	21.90
19	1.018	5.74	11.48	16.25	95	1.379	7.78	15.56	22.01
20	1.020	5.75	11.50	16.28	96	1.386	7.82	15.64	22.12
21	1.022	5.76	11.53	16.31	97	1.393	7.86	15.71	22.23
22	1.024	5.77	11.55	16.34	98	1.400	7.90	15.79	22.35
23	1.026	5.79	11.57	16.38	99	1.407	7.94	15.87	22.46
24	1.028	5.80	11.60	16.41	100	1.414	7.98	15.95	22.57
25	1.031	5.81	11.63	16.45	101	1.421	8.02	16.03	22.68
26	1.033	5.83	11.66	16.49	102	1.428	8.06	16.11	22.80
27	1.036	5.84	11.68	16.53	103	1.436	8.10	16.19	22.91
28	1.038	5.86	11.71	16.57	104	1.443	8.14	16.27	23.03
29	1.041	5.87	11.74	16.62	105	1.450	8.18	16.36	23.14
30	1.044	5.89	11.78	16.66	106	1.457	8.22	16.44	23.26
31	1.047	5.90	11.81	16.71	107	1.465	8.26	16.52	23.37
32	1.050	5.92	11.84	16.76	108	1.472	8.30	16.60	23.49
33	1.053	5.94	11.88	16.81	109	1.479	8.34	16.69	23.61
34	1.056	5.96	11.91	16.86	110	1.487	8.38	16.77	23.73
35	1.059	5.98	11.95	16.91	111	1.494	8.43	16.85	23.84
36	1.063	5.99	11.99	16.96	112	1.501	8.47	16.94	23.96
37	1.066	6.01	12.03	17.02	113	1.509	8.51	17.02	24.08
38	1.070	6.03	12.07	17.07	114	1.516	8.55	17.11	24.20
39	1.073	6.05	12.11	17.13	115	1.524	8.60	17.19	24.32
40	1.077	6.07	12.15	17.19	116	1.532	8.64	17.28	24.44
41	1.081	6.10	12.19	17.25	117	1.539	8.68	17.36	24.56
42	1.085	6.12	12.23	17.31	118	1.547	8.72	17.45	24.69
43	1.089	6.14	12.28	17.37	119	1.554	8.77	17.53	24.81
44	1.093	6.16	12.32	17.44	120	1.562	8.81	17.62	24.93
45	1.097	6.18	12.37	17.50	121	1.570	8.85	17.71	25.05
46	1.101	6.21	12.42	17.57	122	1.577	8.90	17.79	25.18
47	1.105	6.23	12.46	17.63	123	1.585	8.94	17.88	25.30
48	1.109	6.26	12.51	17.70	124	1.593	8.98	17.97	25.42
49	1.114	6.28	12.56	17.77	125	1.601	9.03	18.06	25.55
50	1.118	6.31	12.61	17.84	126	1.609	9.07	18.15	25.67
51	1.123	6.33	12.66	17.92	127	1.616	9.12	18.23	25.80
52	1.127	6.36	12.71	17.99	128	1.624	9.16	18.32	25.92
53	1.132	6.38	12.77	18.06	129	1.632	9.21	18.41	26.05
54	1.136	6.41	12.82	18.14	130	1.640	9.25	18.50	26.18
55	1.141	6.44	12.87	18.21	131	1.648	9.30	18.59	26.30
56	1.146	6.46	12.93	18.29	132	1.656	9.34	18.68	26.43
57	1.151	6.49	12.98	18.37	133	1.664	9.38	18.77	26.56
58	1.156	6.52	13.04	18.45	134	1.672	9.43	18.86	26.69
59	1.161	6.55	13.10	18.53	135	1.680	9.48	18.95	26.81
60	1.166	6.58	13.15	18.61	136	1.688	9.52	19.04	26.94
61	1.171	6.61	13.21	18.70	137	1.696	9.57	19.13	27.07
62	1.177	6.64	13.27	18.78	138	1.704	9.61	19.22	27.20
63	1.182	6.67	13.33	18.86	139	1.712	9.66	19.32	27.33
64	1.187	6.70	13.39	18.95	140	1.720	9.70	19.41	27.46
65	1.193	6.73	13.45	19.04	141	1.729	9.75	19.50	27.59
66	1.198	6.76	13.52	19.12	142	1.737	9.80	19.59	27.72
67	1.204	6.79	13.58	19.21	143	1.745	9.84	19.68	27.85
68	1.209	6.82	13.64	19.30	144	1.753	9.89	19.78	27.98
69	1.215	6.85	13.70	19.39	145	1.761	9.93	19.87	28.11
70	1.221	6.88	13.77	19.48	146	1.770	9.98	19.96	28.24
71	1.226	6.92	13.83	19.57	147	1.778	10.03	20.05	28.38
72	1.232	6.95	13.90	19.67	148	1.786	10.07	20.15	28.51
73	1.238	6.98	13.97	19.76	149	1.794	10.12	20.24	28.64
74	1.244	7.02	14.03	19.85	150	1.803	10.17	20.34	28.77
75	1.250	7.05	14.10	19.95					

TABLE 5. VASCULAR PLANT SPECIES CODES AND GROWTH-FORM ASSIGNMENTS

Dog Prairie (UDOG, Block 4)

Grasses

AGSC*	*Agrostis scabra*
BROMU	*Bromus* spp. (may be several)
BRVU	*Bromus vulgaris*
DAGL	*Dactylis glomerata*
DESCX	*Deschampsia* spp. *(D. elongata* and *D. danthonioides)*
ELGL	*Elymus glaucus*
FEOC	*Festuca occidentalis*
FESTU	*Festuca* sp.
FESU2	*Festuca subuliflora*
MESU	*Melica subulata*
PHPR	*Phleum pratense*
TRCA	*Trisetum canescens*

Sedges and Rushes

CADE	*Carex deweyana*
CAPE5	*Carex pensylvanica*
CAREX	*Carex* sp.
LUCA2	*Luzula campestris*
LUPA	*Luzula parviflora*

Ferns and Fern Allies

ASDE	*Aspidotis densa*
CHEIL*	*Cheilanthes* sp.
POMU	*Polystichum munitum*
PTAQ	*Pteridium aquilinum*
WOOR	*Woodsia oregana*

Forbs

ACMI	*Achillea millefolium*	EPILO	*Epilobium* sp.	PEGA2	*Perideridia gairdneri*
ACRU	*Actaea rubra*	EPMI	*Epilobium minutum*	PERA	*Pedicularis racemosa*
ACTR	*Achlys triphylla*	EPPA	*Epilobium paniculatum*	PHACX	*Phacelia* spp. (*P. heterophylla and P. hastata*)
ADBI	*Adenocaulon bicolor*	EPWA	*Epilobium watsonii*	PLFI2	*Pleuricospora fimbriolata*
ANDE	*Anemone deltoidea*	FRVE	*Fragaria vesca*	POGL	*Potentilla glandulosa*
ANLY2*	*Anemone lyallii*	FRVI	*Fragaria virginiana*	POMI2	*Polygonum minimum*
AQFO	*Aquilegia formosa*	GALIU	*Galium* sp.	PYAP	*Pyrola aphylla*
ARHI*	*Arabis hirsuta*	GAOR	*Galium oreganum*	PYAS	*Pyrola asarifolia*
ARMA3	*Arenaria macrophylla*	GATR	*Galium triflorum*	PYPI	*Pyrola picta*
ASCA3	*Asarum caudatum*	GICA*	*Gilia capitata*	PYSE	*Pyrola secunda*
ASRA	*Aster radulinus*	GNMI	*Gnaphalium microcephalum*	PYUN	*Pyrola uniflora*
CABU2	*Calypso bulbosa*	GOOB	*Goodyera oblongifolia*	RAUN2	*Ranunculus uncinatus*
CASC2	*Campanula scouleri*	HAUN	*Habenaria unalascensis*	SADO	*Satureja douglasii*
CIAL	*Circaea alpina*	HIAL	*Hieracium albiflorum*	SAGR*	*Sanicula graveolens*
CICA3	*Cirsium callilepes*	HYMO	*Hypopitys monotropa*	SCUTT*	*Scuttelaria* sp.
CIVU	*Cirsium vulgare*	LAMU	*Lactuca muralis*	SEBO	*Senecio bolanderi*
CLUN	*Clintonia uniflora*	LANE	*Lathyrus nevadensis*	SEOR2	*Sedum oreganum*
COGR	*Collinsia grandiflora*	LICA3	*Listera caurina*	SMRA	*Smilacina racemosa*
COGR	*Collomia grandiflora*	LIWA	*Lilium washingtonianum*	SMST	*Smilacina stellata*
COHE	*Collomia heterophylla*	LOTR*	*Lomatium triternatum*	TITRT	*Tiarella trifoliata trifoliata*
COLI2*	*Collomia linearis*	LOPU	*Lotus purshianus*	TITRU	*Tiarella trifoliata unifoliata*
COMA3	*Corallorhiza maculata*	MAGR	*Madia gracilis*	TRCY*	*Trifolium cyathiferum*
COPA	*Collinsia parviflora*	MIGR	*Microsteris gracilis*	TRVA*	*Trifolium variegatum*
COST2	*Corallorhiza striata*	MIGU*	*Mimulus guttatus*	TRLA2	*Trientalis latifolia*
CRAF*	*Cryptantha affinis*	MIMO	*Mimulus moschatus*	TROV	*Trillium ovatum*
DENU3	*Delphinium nuttallianum*	MITEX	*Mitella* spp. (*M. breweri, M. pentandra, and M. trifida*)	VAHE	*Vancouveria hexandra*
DIHO	*Disporum hookeri*	MOSI	*Montia sibirica*	VIAM	*Vicia americana*
EBAU	*Eburophyton austiniae*	NEPA	*Nemophila parviflora*	VIGL	*Viola glabella*
EPAN	*Epilobium angustifolium*	OROBA*	*Orobanche* sp.	VIOLA	*Viola* sp.
EPGL*	*Epilobium glaberrimum*	OSCH	*Osmorhiza chilensis*	VISE	*Viola sempervirens*

Sub-shrubs

CHME	*Chimaphila menziesii*
CHUM	*Chimaphila umbellata*
LIBO2	*Linnaea borealis*
LOCI	*Lonicera ciliosa*
PEDE	*Penstemon deustus*
RULA	*Rubus lasiococcus*
RUNI	*Rubus nivalis*
RUUR	*Rubus ursinus*
WHMO	*Whipplea modesta*

Low Shrubs

APAN	*Apocynum androsaemifolium*
ARNE*	*Arctostaphylos nevadensis*
BENE	*Berberis nervosa*
CEPR*	*Ceanothus prostratus*
PAMY	*Pachistima myrsinites*
RIER*	*Ribes erythrocarpum*
SYMO	*Symphoricarpos mollis*

Tall Shrubs

AMAL	*Amelanchier alnifolia*
ARPA*	*Arctostaphylos patula*
BEAQ	*Berberis aquifolium*
COCOC	*Corylus cornuta californica*
HODI	*Holodiscus discolor*
RICE*	*Ribes cereum*
RILA	*Ribes lacustre*
RILO	*Ribes lobbii*
RIBES*	*Ribes* sp.
RIVI	*Ribes viscosissimum*
ROGY	*Rosa gymnocarpa*
RUPA	*Rubus parviflorus*
SOSC2*	*Sorbus scopulina*
VAME	*Vaccinium membranaceum*

*** = found on site, but not in sample plots**

TABLE 5. VASCULAR PLANT SPECIES CODES AND GROWTH-FORM ASSIGNMENTS

Dog Prairie (UDOG, Block 4) (Continued)

Understory Hardwoods

CACH	*Castanopsis chrysophylla*
QUGA*	*Quercus garryana*

Understory Conifers

ABCO	*Abies concolor*	PSME	*Pseudotsuga menziesii*
ABLA2	*Abies lasiocarpa*	TABR	*Taxus brevifolia*
CADE3	*Calocedrus decurrens*	TSHE	*Tsuga heterophylla*
PIMO	*Pinus monticola*		

*** = found on site, but not in sample plots**

TABLE 6. TREE SPECIES CODES (by block)

Watson Falls (UDIL, Blk 1)	
Hardwoods	
CACH	*Castanopsis chrysophylla*
CONU	*Cornus nuttallii*
PREM	*Prunus emarginata*
PRVI	*Prunus virginiana*
RHPU	*Rhamnus purshiana*
Conifers	
ABAM	*Abies amabilis*
ABCO	*Abies concolor*
ABMAS	*Abies magnifica shastensis*
CADE3	*Calocedrus decurrens*
PIEN	*Picea engelmannii*
PICO	*Pinus contorta*
PIMO	*Pinus monticola*
PINUS	*Pinus* sp.
PIPO	*Pinus ponderosa*
PSME	*Pseudotsuga menziesii*
TABR	*Taxus brevifolia*
THPL	*Thuja plicata*
TSHE	*Tsuga heterophylla*
TSME	*Tsuga mertensiana*

Dog Prairie (UDOG, Blk 4)	
Hardwoods	
CACH	*Castanopsis chrysophylla*
Conifers	
ABAM	*Abies amabilis*
ABCO	*Abies concolor*
ABLA2	*Abies lasiocarpa*
ABMAS	*Abies magnifica shastensis*
CADE3	*Calocedrus decurrens*
PIMO	*Pinus monticola*
PSME	*Pseudotsuga menziesii*
TABR	*Taxus brevifolia*
TSHE	*Tsuga heterophylla*

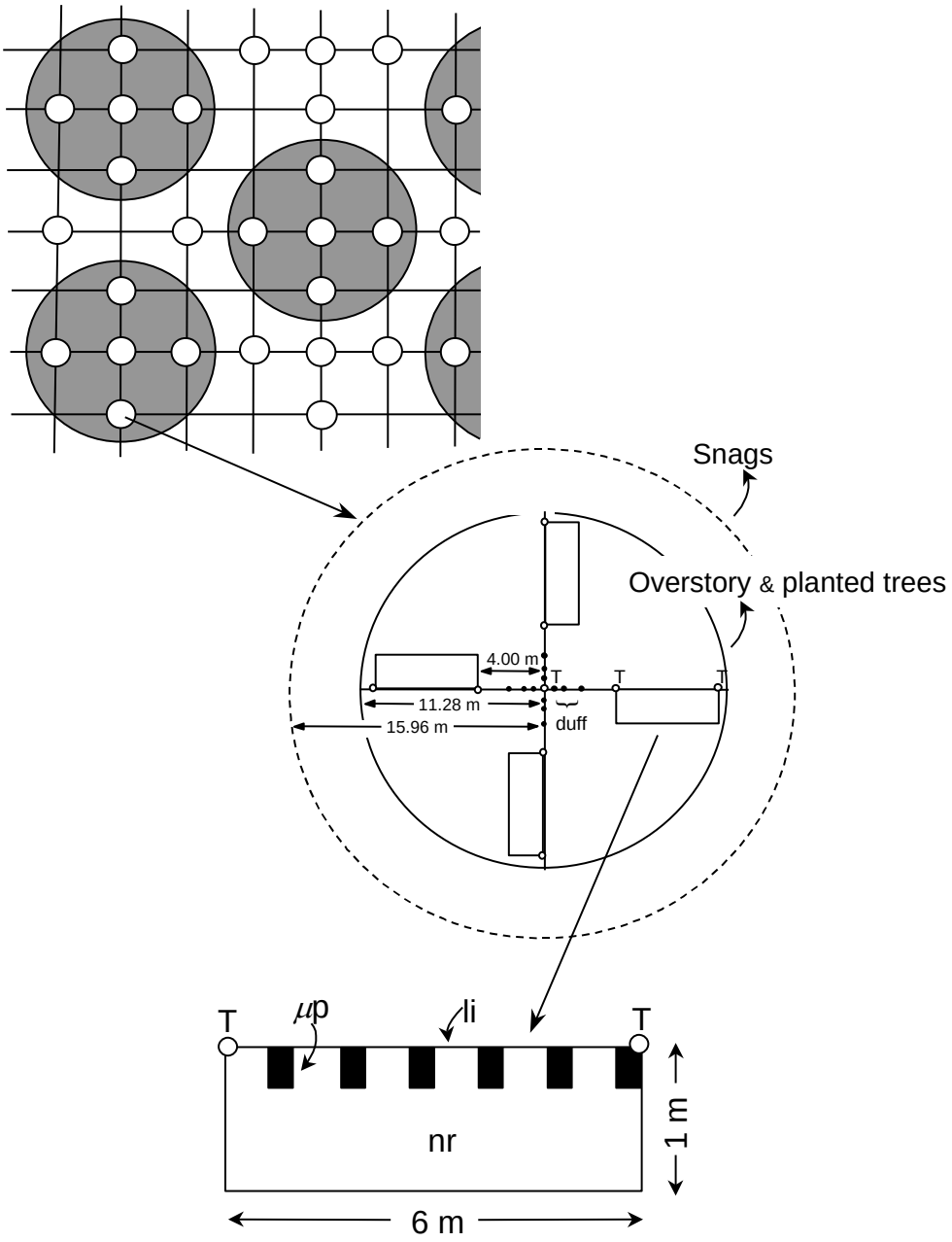
Butte (GRAN, Blk 5)	
Hardwoods	
CONU	*Cornus nuttallii*
RHPU	*Rhamnus purshiana*
PREM	*Prunus emarginata*
PRVI	*Prunus virginiana*
PRUNU	*Prunus* sp.
Conifers	
ABAM	*Abies amabilis*
ABGR	*Abies grandis*
ABLA2	*Abies lasiocarpa*
ABPR	*Abies procera*
CADE3	*Calocedrus decurrens*
CHNO	*Chamaecyparis nootkatensis*
PIEN	*Picea engelmannii*
PICO	*Pinus contorta*
PIMO	*Pinus monticola*
PSME	*Pseudotsuga menziesii*
TABR	*Taxus brevifolia*
THPL	*Thuja plicata*
TSHE	*Tsuga heterophylla*
TSME	*Tsuga mertensiana*

Little White Salmon (GMTA, Blk 6)	
Hardwoods	
ACMA	*Acer macrophyllum*
CONU	*Cornus nuttallii*
Conifers	
ABAM	*Abies amabilis*
ABGR	*Abies grandis*
ABPR	*Abies procera*
PIMO	*Pinus monticola*
PSME	*Pseudotsuga menziesii*
TABR	*Taxus brevifolia*
TSHE	*Tsuga heterophylla*

Paradise Hills (GWIR, Blk 7)	
Hardwoods	
FRLA2	*Fraxinus latifolia*
POTR2	*Populus trichocarpa*
Conifers	
ABAM	*Abies amabilis*
ABGR	*Abies grandis*
ABLA2	*Abies lasiocarpa*
ABPR	*Abies procera*
PIEN	*Picea engelmannii*
PIMO	*Pinus monticola*
PSME	*Pseudotsuga menziesii*
TABR	*Taxus brevifolia*
THPL	*Thuja plicata*
TSHE	*Tsuga heterophylla*
TSME	*Tsuga mertensiana*

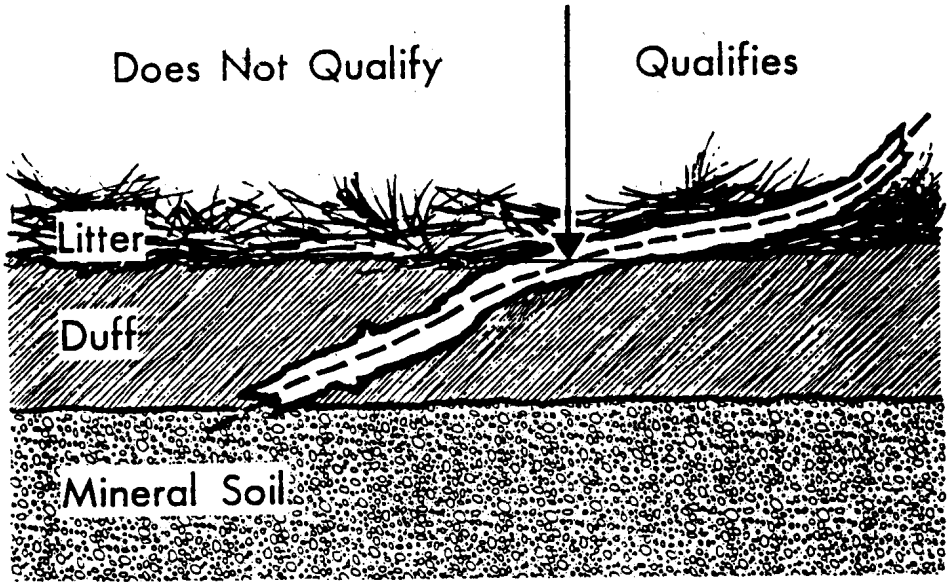
Capitol Forest (CFOR, Blk 8)	
Hardwoods	
ACMA	*Acer macrophyllum*
ALRU	*Alnus rubra*
POTR2	*Populus trichocarpa*
PREM	*Prunus emarginata*
RHPU	*Rhamnus purshiana*
Conifers	
ABGR	*Abies grandis*
PSME	*Pseudotsuga menziesii*
TABR	*Taxus brevifolia*
THPL	*Thuja plicata*
TSHE	*Tsuga heterophylla*

FIGURE 1. VEGETATION SAMPLING DESIGN

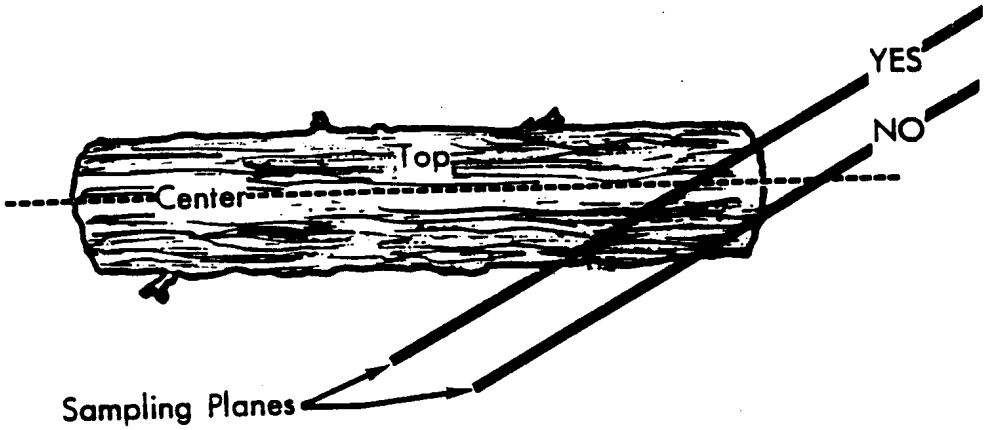


Plot and transect layout for sampling overstory and understory vegetation. Understory sampling locations are coded as follows: **T** = truck mirror densiometer for overstory canopy cover; **duff** (filled circles) = sites for measurement of duff and litter depth [not measured in year 2000); **μp** = Daubenmire microplots (0.2 x 0.5 m) for ground surface conditions, herb presence/absence or cover/height, bryophyte and lichen presence/absence, density of tree seedlings; **li** = line intercept for tall shrub and understory tree cover/height, coarse woody debris, and disturbance assessments; and **nr** = density and size classes of natural regeneration.

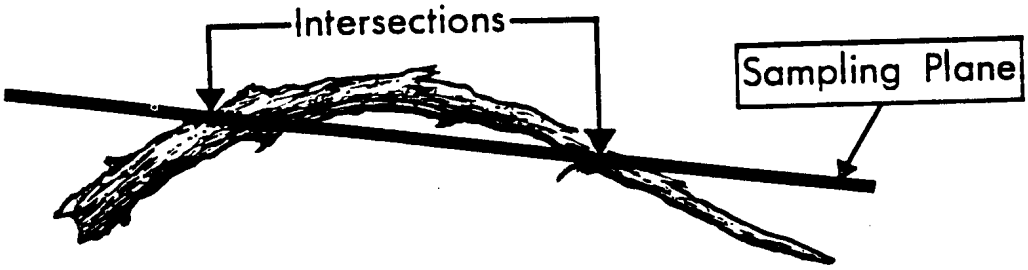
FIGURE 2. COARSE WOODY DEBRIS RULES
(not relevant for Year 2000 sampling)



--Regardless of size, pieces are tallied only when intersection lies in and above the litter (right of arrow).

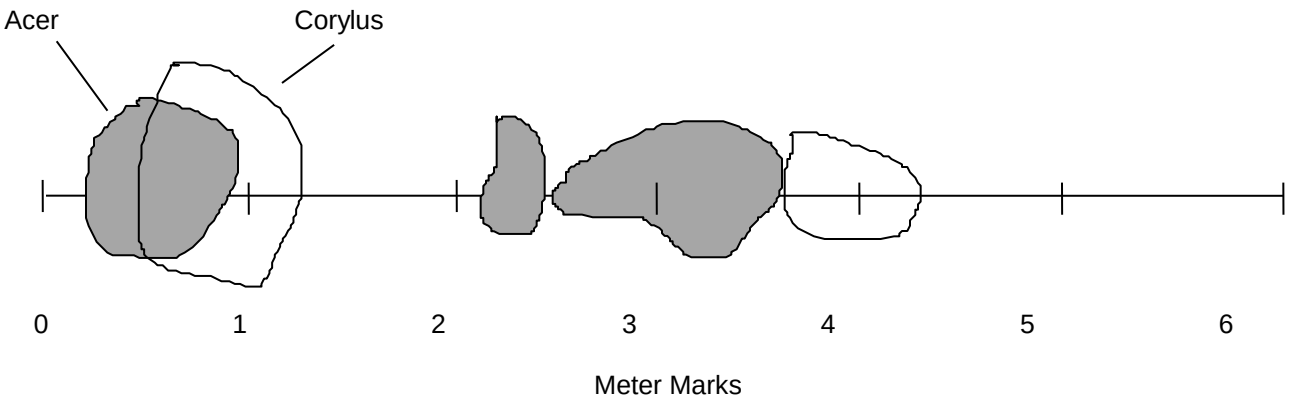


--An intersection at the end of a branch or log must include the central axis to be tallied.



--Count both intersections for a curved piece.

FIGURE 3. LINE INTERCEPT METHODOLOGY



FORM U-D. TALL SHRUBS and UNDERSTORY TREES: COVER AND HEIGHT (POST-HARVEST)

Species name	LF	Species code	LC	Start; End	Start; End	Start; End	Start; End	Start; End
Tot. tall shrub	TS	SHRUB	1	0.25; 1.25	2.10; 2.30	2.35; 4.25	___.__;___.__	___.__;___.__
Acer circinatum	TS	ACCI	1	0.25; 0.95	2.10; 2.30	2.35; 3.60	___.__;___.__	___.__;___.__
Corylus cornuta	TS	COCOC	1	0.50; 1.25	3.60; 4.25	___.__;___.__	___.__;___.__	___.__;___.__
_____	___	_____	__	___.__; ___.__	___.__; ___.__	___.__; ___.__	___.__;___.__	___.__; ___.__

FIGURE 4. STANDARDS FOR MEASURING DIAMETERS OF TREES

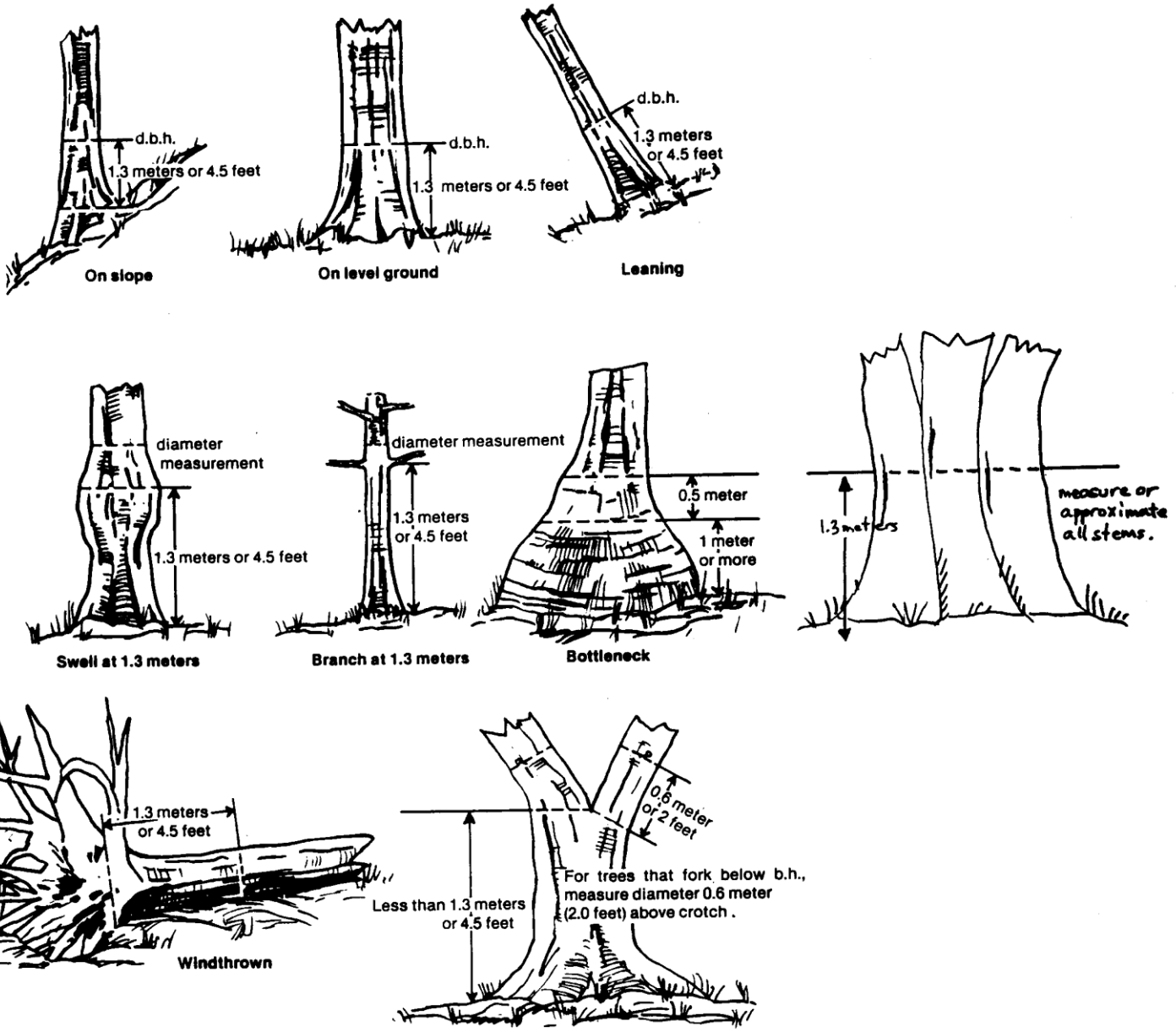


FIGURE 5. LOG AND SNAG DECAY CLASSES