

# CFI - 2005 - JDSF

Field Instructions - ver. 2.1 - June 16, 2005  
Continuous Forest Inventory  
Jackson Demonstration State Forest

## PROJECT OVERVIEW

The Jackson Demonstration State Forest Continuous Forest Inventory (CFI) system was installed in 1958-1960, and the plots have been remeasured every five years since then, with the exceptions of 1994 and 2004. The intention is to return to a five-year cycle with the 2005 remeasurement.

The original plots were rectangular 1/2-acre plots, 2 chains east-west by 2.5 chains north-south. Witnessed redwood stakes were used to mark the north end (BP, or Beginning Point) and south end (EP, or End Point) of the center-line. In 1989 the plot shape and size were changed to circular and 1/5-acre, with each new plot centered over the old plot (plot center at the mid-point of the original center-line). In both cases, subplots were incorporated to measure smaller trees and tree details. Because of the previous larger plot size, there are many tagged trees that now fall outside the new, smaller plots.

## EQUIPMENT

compass  
clinometer or relaskop  
D-tape, or log tape with diameter scale  
log tape, 75 foot or longer  
ruler with 1/20-inch scale  
tatum or clipboard  
field instructions  
plot map  
plot sheet with previous measurements  
flagging, black-and-white stripe  
flagging, green message  
aluminum nails, ~30  
tree number tags, ~20  
K-tags, ~4  
plot center stake  
hatchet, with nail puller  
increment borer, min. 20"  
bees wax for borer  
pocket calculator with trig functions  
spray paint, yellow (two, at plot) and blue (at TOP)  
pencils  
flagging pen (Sharpie)  
hip chain

### Optional:

aerial photos  
laser distance device with extra batteries  
GPS unit  
additional increment borer  
number punch set for tree tags

### Safety:

handi-talkie  
first aid kit  
whistles  
flashlight  
enough food, water, clothing

## **PLOT GRID and NUMBERING**

Plots are located on a 3/4-mile square grid. North-south lines are numbered 1 through 23, west to east. Plots are numbered starting with number 1 at the north end of each line. Thus, plot 7-3 is the third plot from the north, on the seventh line from the west.

## **PREPARING PLOT SHEETS**

Pre-numbered plot sheets will be printed for each plot. The following data from the most recent previous measurement will be shown: *Plot data*: Plot Number, Aspect, Slope, Plot Reference Trees; *Tree data*: Tree Number, Tag Number, Species, DBH, Live Crown Ratio, Height/Year.

"Tree Number" is how the tree is identified in the database. It is the number on the tag on the stump. "Tag Number" is the number on the tag at breast height and (if different than Tree Number) is how the tree was identified in previous CFI implementations.

If the tree has a previous height measurement, that height and the year it was measured will be shown.

Trees will be sorted on the plot sheet by tree number and arranged so that the trees on the 1/20-acre subplot are grouped together at the top.

## **PLOT LAYOUT**

A CFI plot is made up of three concentric circular plots:

- **1/5-acre main plot** (radius = 52.66')
- **1/20-acre subplot** (radius = 26.33')
- **1/100-acre regeneration plot** (radius = 11.78')

## **LOCATING PLOTS**

Access to each plot is described on the plot sheets from previous measurements. In some cases it may be useful to refer to routes from more than the most recent visit. Diligent searching may yield aerial photos with plot locations marked.

Take-Off-Points (TOPs) from roads or other easily identified locations have been established. Original TOPs are generally K-tags nailed to large stumps or trees on the side of the road, highlighted by blue and yellow paint and flagging. TOPs set in 1989 or 1999 were orange stakes referenced by K-tags, often on very small trees, with vertical stripes of blue paint. Many of the '89 and '99 stakes in public-use areas have been vandalized. Blue and yellow flagging was used to mark the route from the TOP to the plot through 1984; black-and-white striped flagging was used in 1989 and 1999. The route from TOP to plot is usually a cardinal direction, with distance expressed in chains (1 chain = 66 feet). Some plot sheets describe an easier or shorter route using ridges, trails, or other features.

If a new road provides for better access, set a new TOP and document it on the plot sheet. Mark the TOP with an orange stake, and witness it with a K-tag on a large old growth redwood stump or large live tree. On the K-tag, scribe "TOP", plot number, and azimuth and distance in chains to the plot. Paint a yellow and blue box around the K-tag, and paint "TOP" on the stump or tree facing the road. Record the road distance in tenths of a mile to the new TOP from a road junction or other landmark, and sketch a map on the plot sheet.

The center point of the 1/5-acre circular plot should already be marked by a plastic orange stake and witnessed by K-tags on two nearby stumps or trees.

### **MARKING PLOT CENTER**

Note: IT IS EXTREMELY IMPORTANT THAT PLOT CENTERS BE MAINTAINED AND CORRECTLY LOCATED. If the plot center stake is missing but the witness trees can be identified either by K-tags or other reliable evidence, relocate the plot center using the azimuth and distance information for the witness trees. (Note that distances are horizontal and measured from the K-tag, and azimuth is from the K-tag to the plot center.) Install a new center stake and replace any missing K-tags. Inscribe K-tags with plot number and azimuth and horizontal distance from the K-tag to the plot center. Document the replacement of center stake or K-tags on the plot sheet.

If the witness trees cannot be identified, approximate the plot center as described below and make all plot and tree measurements that can be made without knowing the precise plot center location. Tagged "survivor" trees that were measured at the last visit should be remeasured. However, it may be difficult to determine if ingrowth trees or stumps of harvested trees near the plot boundary are actually in or out. Install a center stake at the approximate center and attach a message flag or tag saying "APPROX". Take notes and make sketches to clearly describe the situation to the CFI project forester.

To approximate plot center, use one or more of the following methods:

- Observe the orientation of tree number tags on stumps and other markings that may generally face plot center. (DBH tags and nails are usually on the uphill side and won't aid in locating plot center.)
- Observe which trees were in or out of the 1/5-acre and 1/20-acre plots at the last measurement to approximate the plot boundaries.
- If the original Beginning Point or End Point stakes can be found, use them to approximate plot center, which should be 1.25 chains from each of them, i.e. midway on the line between them.

Should plot center fall on a log, tree, stump, or similar object where a stake cannot be placed, a K-tag nailed to the surface of the object may be substituted as plot center. If the plot center is in a traveled road or some other location where a center stake cannot be left, make sure that the witness trees are substantial and clearly identified and that the distances and azimuths are accurately recorded. Consider setting supplemental witness trees.

### **PLOT DATA**

The following information is recorded in the plot header:

1. **Plot Number** - Four digits, e.g. 01-05, not 1-5 or 105.
2. **Cruisers** - Full last names.
3. **Date** - mm/dd/yy, e.g. 7/14/05. Do not omit the year.
4. **Aspect** - Confirm that the pre-recorded aspect is reasonable. (The direction the plot generally faces, using an 8-point compass.)
5. **Slope** - Confirm that the pre-recorded slope is reasonable. (Average of upslope and downslope.)

For plot center witness trees, confirm or correct existing data, or record data for new witness trees.

For TOP, confirm or correct existing information, or record information for a new route to the plot.

**TREE DATA**

Different tree data is taken on each of the three different concentric plots. Plot boundaries must be precisely determined by correcting for slope and measuring with a tape. The following table provides corrections for many slopes for each of the plot sizes. If more precise corrections are needed, or for slopes outside the range of the table, conversions will need to be made using a calculator with trig functions.

**Slope distance in feet for plot radius  
 at various percent slopes.**

<b>%</b>	<b>1/5-acre</b>	<b>1/20-acre</b>	<b>1/100-acre</b>
<b>0</b>	<b>52.66</b>	<b>26.33</b>	<b>11.78</b>

<b>5</b>	52.73	26.36	11.79
<b>10</b>	52.92	26.46	11.84
<b>15</b>	53.25	26.62	11.91
<b>20</b>	53.70	26.85	12.01
<b>25</b>	54.28	27.14	12.14
<b>30</b>	54.98	27.49	12.30
<b>35</b>	55.79	27.90	12.48
<b>40</b>	56.72	28.36	12.69
<b>45</b>	57.75	28.87	12.92
<b>50</b>	58.88	29.44	13.17
<b>55</b>	60.10	30.05	13.44
<b>60</b>	61.41	30.71	13.74
<b>65</b>	62.81	31.40	14.05
<b>70</b>	64.28	32.14	14.38
<b>75</b>	65.83	32.91	14.73
<b>80</b>	67.44	33.72	15.09
<b>85</b>	69.11	34.56	15.46
<b>90</b>	70.85	35.42	15.85
<b>95</b>	72.63	36.32	16.25
<b>100</b>	74.47	37.24	16.66

(To calculate slope distance, divide the horizontal distance by the cosine of the vertical angle in degrees. E.g.,  $\cos 52^\circ = 0.616$ . For the 1/5-acre plot:  $52.66' \div 0.616 = 85.49'$ .)

**SD = HD ÷ cos (slope in degrees)**

**HD = SD x cos (slope in degrees)**

**Subplot (1/20-acre ... plot radius = 26.33 feet):**

The following information is recorded for live trees **7.0" DBH and larger**:

- Tree Number (new number and tag for ingrowth)
- Species
- Status
- DBH (to nearest 1/10 inch)
- LCR (Live Crown Ratio) - conifers only
- Total Height (all ingrowth, all previous conifer height trees, and up to four hardwoods; unless not suitable as described below)
- Defect Code (conifers only)
- Defect Percent (conifers only)
- 10-Year Radial Growth (for ingrowth only)

**Main Plot outside the Subplot (1/5-acre ... plot radius = 52.66 feet):**

The following information is recorded for live trees **11.0" DBH and larger**:

- Tree Number (new number and tag for ingrowth)
- Species
- Status
- DBH (to nearest 1/10 inch)
- LCR (Live Crown Ratio) - conifers only
- Total Height (all ingrowth, and all conifers with previous heights, unless not suitable)
- 10-Year Radial Growth (for ingrowth only)

**Tree Number and Tags**

Existing trees that were measured at the last remeasurement will usually already have two aluminum number tags. One tag will be found nailed at the stump facing plot center. The number on the stump tag is called the **Tree Number** and is used to identify the tree in the current database. A second tag may be found nailed at breast height, with a number that is often different than the Tree Number. The number on this tag is called the **Tag Number**, and, if different, is used to relate the tree and its current Tree Number to the tree's ID in earlier CFI databases.

(Trees that were first tagged in 1989 and later will usually have the same Tree and Tag Numbers, or may have just an empty nail at breast height and no Tag Number.)

- **DBH tag:**      **Tag Number**
- **Stump tag:**    **Tree Number**

For trees that are already tagged, confirm both the Tree Number and the Tag Number. Note in Remarks if there is a discrepancy between the numbers on the tags and the numbers on the previous data sheets. If either tag is missing, replace it as follows. For the stump tag, use a hard aluminum tag and punch or scribe the Tree Number on it. For the DBH tag, use a soft aluminum tag and also scribe the Tree Number (not the old Tag Number) on it. (We won't be maintaining the old Tag Numbers. As they fall off, grow over, or need replacing, we will update them with Tree Numbers.) The nail should be driven into the tree far enough so that it is secure, but leaving most of the nail exposed.

Make sure that there is enough nail length for the tree to grow without overgrowing the nail head. If necessary, pull the nail partly out of the tree to give it more room. If it isn't possible to pull the nail

out, or if it can't be done without disrupting the bark at breast height, copy the Tree Number onto a new aluminum tag and nail it next to the tag being overgrown.

Nails should be slightly angled with the head down so that the tags will hang away from the tree. Remember to use only aluminum nails and tags.

An **ingrowth** tree is one which has grown sufficiently since the last measurement so that it now meets the minimum DBH to be counted (7.0" for the 1/20-acre subplot, 11.0" for the 1/5-acre main plot). For ingrowth trees, scribe two aluminum tags (one hard, one soft) with the next higher Tree Number in sequence on the plot list. Measure breast height carefully and nail the soft tag to the tree at breast height on the uphill side of the tree, or as near to there as possible. Make sure to keep the bark intact at breast height. Nail the hard tag to the base of the tree below stump height, facing plot center or as near to there as possible. For the stump tag only, if the bark is very thick or loose, it is permitted to remove just the outer bark to provide a solid base for the nail. Make sure that the nails are secure.

## Species

Use the following alpha codes to record tree species (the earlier numeric codes are included in parentheses for reference to past-years' plot data):

<u>CONIFERS</u>	<u>HARDWOODS</u>
<b>OR</b> (01) Old-growth Redwood	<b>T</b> (11) Tanoak
<b>OD</b> (02) Old-growth Douglas-fir	<b>M</b> (12) Pacific Madrone
<b>YR</b> (03) Young-growth Redwood	<b>A</b> (13) Red Alder
<b>YD</b> (04) Young-growth Douglas-fir	<b>BY</b> (14) California Bay
<b>G</b> (05) Grand Fir	<b>L</b> (15) Live Oak
<b>H</b> (06) Western Hemlock	<b>W</b> (16) Willow
<b>B</b> (07) Bishop Pine	<b>P</b> (17) Bigleaf Maple
<b>Y</b> (08) Cypress	<b>E</b> (18) Eucalyptus
<b>OC</b> (09) Other Conifer	<b>OH</b> (19) Other Hardwood
<b>S</b> Sitka Spruce	<b>X</b> Wax myrtle
	<b>C</b> Chinquapin

When entering **OC** or **OH**, record the species in Remarks. If uncertain, guess and include a question mark. If unknown, enter Unknown Species in Remarks, and bring in a sample to play stump-the-RPF.

## Status

Record the status of each tree on the 1/5-acre or 1/20-acre plot as follows (the earlier numeric codes are included in parentheses for reference to past-years' plot data):

- SV** (1) **Survivor** - live tree with number tag(s), previously measured - still in place. (*confirm, maintain, and replace stump and DBH tags as described above*)
- IG** (2) **Ingrowth** - live tree that has reached the minimum DBH since the last plot measurement (*number and tag the tree as described above - measure for height and core for radial growth as described below*)
- MS** (3) **Mortality-Snag** - dead standing tree with number tag(s), died since last plot measurement (*blaze the tree near the DBH nail, and paint a yellow "X" facing plot center*)
- MD** (-) **Mortality-Down** - dead down tree with number tag(s), died since last plot measurement (*blaze the tree by chopping into it near the DBH point, and paint a yellow "X" on the side near the base*)
- HV** (4) **Harvest** - tree was felled and removed since last plot measurement (*drive two nails into the top of the stump, leaving about one inch exposed - paint a yellow "X" on the side of the stump facing plot center*)
- IM** (23) **Ingrowth-Mortality** - tree has grown to reach the minimum DBH, but has died (*treat as for MS or MD - paint yellow "X"*)
- IH** (24) **Ingrowth-Harvest** - tree grew to reach the minimum DBH, but was harvested (*treat as for HV*)
- XS** (91) **Missed Survivor** - live tree appears to have been big enough to include during the last measurement, but was not included (*number and tag the tree as for ingrowth - core for radial growth and measure height*)
- XM** (93) **Missed-Mortality** - tree appears to have been alive and big enough to include during the last measurement, but was not included, and has died (*treat as for code IM*)
- XH** (94) **Missed-Harvest** - tree appears to have been alive and big enough to include during the last measurement, but was not included, and has been felled and removed (*treat as for code IH*)

## DBH

Measure DBH to the nearest 1/10-inch using a D-tape whenever possible. For trees that have nails at breast height, measure DBH immediately above the nail. (Fused trees may have two nails at breast height on opposite sides of the tree for taking a half-diameter; see discussion below.) Ensure that the tape is perpendicular to the axis of the tree with no sags or twists and that there are no foreign objects caught under it. The tape should be wrapped snugly around the tree, but not tightly enough to compress the bark. This is especially important on young, fast-growing redwoods with soft, spongy bark.

If a complete taped DBH cannot be measured, estimate DBH as precisely as possible and draw a circle around the DBH entry on the plot sheet. In these cases, acceptable methods for estimating DBH include:

- Doubled half-diameter (see discussion under Fused Trees below)
- Biltmore stick (average long and short diameters)
- Calipers (average long and short diameters)
- Diameter bars in relaskop
- Borderline-tree/critical-distance/plot-radius-factor method (ask for instruction)

When establishing breast height on a tree without a DBH nail, measure breast height carefully and drive a nail into the tree at the diameter point on the side where the cruiser will likely stand to measure DBH, usually the uphill side. In the absence of a DBH nail, breast height is 4.5 feet above the ground on the uphill side of the tree, with consideration for the following situations.

- **Irregularities at DBH** - In the case of irregularities at DBH, such as swellings, bumps, depressions, and branches, diameters will be measured immediately above the irregularities at the place where it ceases to affect the normal stem form. Natural swell-butted trees should be measured at a point 1.5 feet above the end of the pronounced swell or bottleneck if the bottleneck is more than 3 feet high.
- **Leaning Trees** - A leaning tree is determined to be In or Out based on the center of the tree at ground level. Breast height is 4.5 feet from ground level along the lean on the uphill side of the tree. The diameter tape must be at right angles to the axis of the tree and not parallel to the ground.
- **Stumps** - When recording stumps of trees with status codes HV, IH, or XH, measure the stump diameters across the long and short axes, and enter the average. Note "stump diameter" in Remarks.
- **Fused Trees** - Fused trees are those that originate as separate stems but where the wood (not just the bark) of the two stems has since grown together. This most often happens with young redwoods growing in a sprout clump, but can happen with other species as well. Trees that are fused at or above the top of the first 16-foot log will be treated as a *single* tree, with a single DBH measurement. All other fused trees will be treated as *separate* stems, with a DBH taken for each stem. If a tree is fused or otherwise obstructed so that a tape cannot be wrapped around it, place two aluminum nails at breast height at directly opposite sides of the bole, such that a line between the two nails would bisect the tree. If possible, orient the nails so that both the slow-growing and fast-growing sides of the tree are incorporated in the measurement. Measure the distance around the tree between the two nails, double it, and record the result as the tree's DBH. In the remarks column on the plot sheet, write "1/2-diameter".

If it looks like two trees will be fused by the next visit, but it is still possible to get a full diameter measurement this time, pre-locate two nails at half the current measured diameter so that they can be used next time, and include a note in Remarks.

- **Forked Trees** - A forked tree, as opposed to a fused tree, originated as a single stem but has since developed multiple stems. If the tree forks at or above 4.5 feet (i.e., the open crotch of the fork is at or above 4.5 feet), treat it as one tree and measure the diameter below any pronounced swell as near to normal breast height as possible.

If the stem forks below 4.5 feet, treat it as two trees. Each fork will be considered a tally tree if the center of the tree is in the plot at the point where DBH is to be measured. Measure the diameter of each fork at a point as near two feet above the crotch as can be readily reached from the ground.

### Live Crown Ratio

Live Crown Ratio (LCR) is the percent of the total height of the tree that is occupied by live crown. Uneven crowns are averaged by visually transferring branches from the longer sides of the crown to fill in gaps on the shorter sides. Disregard limbs having practically no foliage and occasional lone

limbs located well below the general canopy. Estimate LCR to the nearest 5%. Note that redwood trees growing within clumps often have unbalanced crowns.

### **Total Height (specified trees only)**

Unless a tree does not qualify as a height tree for any of the reasons listed below, total height from ground to tip is measured on the following trees:

- Conifer trees which were measured for height during any previous plot visit.
- New ingrowth trees (all species).
- The first four hardwoods on the subplot, selecting in sequence clockwise from north.
- If there is not enough time remaining in the day to begin a new plot, spend up to about 30 minutes measuring heights and diameters on conifer trees that can be found from the 1959 measurement which had heights measured, but which are not on the new 1/5-acre plot. (These will normally have been from the west half of the original rectangular plot.)

The following characteristics disqualify a tree for height measurement:

- Cannot get an accurate DBH to 1/10-inch. (But it's OK to take heights on trees with two nails for doubled half-diameter.)
- Dead or broken top.
- Forks, or multiple stems or tops.
- Heavy lean that cannot be accounted for in height determination.
- Cannot tell for sure where the bottom or top is.

### **Defect (Subplot only)**

Record **Defect Code** and **Percent Deduction** for **subplot conifers** that have at least one 16-foot, 6-inch dib log, using the following codes and deduction guidelines. Deduct only for loss of board foot volume from the merchantable portion of the tree, using only visible indicators, not intuition. If the tree has a defect, but it does not result in a volume deduction, enter the defect code and enter "0" for Percent Deduction. Refer to the log distribution table to determine the percent of total tree volume in each 16-foot log. (The earlier numeric codes are included in parentheses for reference to past-years' plot data.)

- CF** (1) **Catface.** A scar or wound caused by an object scraping against the tree (often from logging equipment or falling trees). Deduction: if there is associated rot or wood loss, 1/3 to 1/2 of the bole for the length of the catface, plus any swelling above.
- CR** (2) **Crook.** A sudden bend or curve in the bole (includes "pistol butt"). Deduction: the length of the affected bole. If there is abnormally reduced diameter at the crook, deduct additional length to reflect what would be there in a normal tree.
- FK** (3) **Fork.** A fork in the main bole with at least one log above it. Deduction: the length of the bole from the swelling to the point where the two forks separate. Where there is a grown-over seam, deduct the length for half the diameter. Above the fork assume that only the larger stem exists. Deduct for reduced diameter as in crook.
- FR** (4) **Fire Scar.** A wound caused by fire, usually in the butt log. Deduction: 1/2 to full diameter for the length of the open scar. Continue deduction for length of any healed-over seam. For large or deep scars, continue deduction at least 8 feet above the seam, allowing for tapering of defect. Clustered adventitious branching (in redwood) often indicates the extent of associated rot. This defect is quite variable, and may be more extensive than expected, particularly on larger and older trees.
- KN** (5) **Large Knots.** Knots over 4" diameter with less than 2' vertically between them. Deduction: 1/2 the cylinder for the affected length.
- KK** (6) **Knot Cluster.** Groups of larger limbs, usually in fir. (See Fire Scar for adventitious branching in redwood.) Deduction: 1/3 to 1/2 of the cylinder for each face affected, for the length affected.
- BL** (7) **Burls.** Dome-shaped growths on the surface of the stem. Deduction: this defect usually does not affect the scaling cylinder. For severe burls, deduct 1/4 of the bole for the length affected.
- ZZ** (8) **Lightning.** A vertical, often spiral, split in the surface of the bole, usually running the entire length of the tree. Deduction: 1/8 to 1/2 of each affected log, depending on depth and tightness of spiral of the scar.
- SW** (9) **Sweep.** A more gentle bend than a crook. It is not a defect unless a portion of a 16' scaling cylinder will project outside the bole. Deduction: the portion of the 16' scaling cylinder that falls outside the tree. (Typically the deduction is 1/4 to 1/2 of the log. If the sweep is so severe that the log can't be mechanically debarked, the entire segment should be culled.) Note that the length of the logs can be adjusted by a good tree faller to account for modest sweep.
- BK** (10) **Broken Top.** Deduction: the missing portion of the tree, plus up to 8' below the break for introduced rot depending on the size and age of the break.
- DT** (11) **Dead Top.** A top which has been dead long enough for the bark and most of the branches to have fallen off (usually gray). Deduction: the length of log(s) in the dead top, plus 8' below.
- BS** (12) **Butt Swell.** Extreme swell in the butt with no other defect indicator. (Douglas-fir and whitewoods only.) Deduction: the entire cylinder for the length of the swelling.
- SP** (13) **Spur.** A dead branch or old dead top protruding from the stem at an acute angle. Deduction: 1/3 of the cylinder for the length of the spur projected to the center of the tree.
- BT** (14) **Butt Rot.** Fungus decay caused by *Polyporus schweinitzii*, as indicated by a "cow pie" conk on the ground. Deduction: 4' to 8' of the butt log, based on swelling.
- CN** (15) **Conk Rot.** Fungus decay of the main stem. Deduction: conk on one face: deduct 6' above and 6' below for 1/2 the cylinder. Multiple conks on more than one face: deduct 6' above and 6' below for the entire cylinder.

- AD** (--) **Animal Damage to Top.** Deduct as for broken top if the taper of the top has been deformed.
- MM** (96) **Multiple Mechanical Defects.**
- MD** (97) **Multiple Decay Defects.**
- MX** (98) **Combination of Mechanical and Decay Defects.**
- XX** (99) **Other.**

Log #	Number of 16-foot logs										
	1	2	3	4	5	6	7	8	9	10	11
11											3
10										3	4
9									4	5	6
8								4	6	7	7
7							5	7	8	8	8
6						5	8	9	10	10	10
5					6	11	12	12	11	11	11
4				8	14	15	15	14	13	12	11
3			10	20	21	19	17	16	15	13	13
2		15	35	31	27	23	20	18	16	15	13
1	100	85	55	41	32	27	23	20	17	16	14

### 10-Year Radial Growth

Radial growth is measured on **new ingrowth trees only** (all species, although some hardwoods may not be readable). Trees should be cored on the side facing plot center, at breast height. If this cannot be done because of steep ground or obstructions, get as close to that location as possible, but stay within two feet of breast height.

Count the last ten years of growth, beginning at the outer edge of the last band of dark, dense latewood. Record the result in 20ths of an inch (e.g. 1.5" is recorded as 30).

### Regeneration Plot (1/100-acre ... plot radius = 11.78 feet)

On the regeneration plot, tally numbers of trees greater than 4.5 feet tall and less than 7.0 inches DBH by species and two-inch DBH class. Trees are in or out based on their center at ground level.

### SITE TREES

At or within 200 feet of each plot (but within the same stand type), select and measure two site trees. If both young-growth redwood and young-growth Douglas-fir are available, select one tree of each species. If only one species is available, select two trees of that species. Note in Remarks if there are no suitable site trees within 200 feet of the plot.

Criteria for a suitable site tree are:

- Age is between 30 and 150. (If no trees over 30 are available, select a tree over 15 years of age.)
- Crown Position is Dominant or Co-dominant, but not Pre-dominant.
- No top damage.
- Vigorous, pointed crown.

- No bole damage that would affect height growth.
- The tree appears to have been growing to its full height potential, with no indication of past competition from taller trees (e.g. large nearby stumps or windfall).
- The increment borer can reach to within two inches of the center.

If the increment borer does not reach to the center of the tree, use the DBH to determine how close it got. If the end of the core is within two inches of the center, it is acceptable to extrapolate. Use the number of rings per inch in the 10 years at the inner end of the core to figure the number of years to add. Note that it is generally easier to reach the center of a large tree by coring from the uphill side, or the side opposite the largest portion of the crown (e.g. core from center of sprout clump).

Record the following information for each site tree:

- Species.
- Total breast-height age.
- DBH to the nearest 1/10 inch.
- Total height to the nearest foot.
- Tree number if located within the plot.
- Distance and azimuth to off-plot site trees (Wrap a flag around off-plot site trees.)

### **PAINTING DBH LINES & TREE NUMBERS**

Before leaving the plot, but after taking all tree measurements, paint a short horizontal line at breast height on each side of the DBH nail, and paint the tree number on the bole facing plot center, using yellow aerosol paint. Attempt to keep the painted numbers as small as possible while remaining legible.