

**FOREST INVENTORY AND ANALYSIS  
NATIONAL CORE FIELD GUIDE**

**VOLUME I: FIELD DATA COLLECTION PROCEDURES FOR PHASE 2 PLOTS**

Version 4.0





## Changes from the Phase 2 Field Guide version 3.0 to version 4.0

Changes documented in change proposals are indicated in **bold** type. The corresponding proposal name can be seen using the comments feature in the electronic file. These change pages are intended to highlight significant changes to the field guide and does not contain all of the details or minor changes.

- **Added: 1.5 PLOT NONSAMPLED REASON.** Added code 11 defined as “Ocean – plot falls in ocean water below mean high tide line.”
- Clarified: 1.7 SUBPLOTS EXAMINED. Clarified text by adding “By default, PLOT STATUS = 1 plots have all 4 subplots examined.”
- Modified: 1.9 FIELD GUIDE VERSION. Modified the *Values* from “3.0” to “4.0”.
- **Modified: 1.11 DECLINATION (CORE OPTIONAL).** Modified the *Values* from “-359.0 to + 359.0” to “+/- 50”.
- **Deleted: 1.15 CREW TYPE.** Dropped this variable.
- **Added: 1.15 CREW NUMBER.**
- **Added: 1.16.7.1 LATITUDE DEGREES.** Added *Values* to be “0-90”.
- **Added: 1.16.8.1 LONGITUDE DEGREES.** Added *Values* to be “1-180”.
- **Modified: 1.16.9 UTM ZONE.** Modified the *Values* from “03-19Q and 03-19W” to “Number varies from 2 in Alaska to 19 on the East Coast. The letter varies from Q in Hawaii to W in Alaska”.
- **Added: 1.16.10 EASTING (X) UTM.** Added *Values* to be “0000000-9999999”.
- **Added: 1.16.11 NORTHING (Y) UTM.** Added *Values* to be “0000000-9999999”.
- **Modified: 1.16.16 GPS ERROR.** Modified *Values* from “000 to 070 if possible” to “000 – 999”.
- **Modified: 1.16.18 GPS FILENAME (CORE OPTIONAL).** Modified *Field width* from “8 characters.3 characters (e.g., R0171519.ssf)” to “15 characters”. Modified *Values* from “Letters and numbers’ to “English words, phrases, and numbers”.
- **Modified: 1.18 PLOT-LEVEL NOTES.** Modified the variable title to “PLOT NOTES”.
- **Added: 2.4.3 CONDITION NONSAMPLED REASON.** Added code 11 defined as “Ocean – Plot falls in ocean water below mean high tide line.”
- **Clarified: 2.5.1 RESERVED STATUS.** Under *When collected*, repeated the information listed in CORE in CORE OPTIONAL also.
- **Clarified: 2.5.2 OWNER GROUP.** Under *When collected*, repeated the information listed in CORE in CORE OPTIONAL also.
- **Clarified: 2.5.7 OWNER CLASS.** Under *When collected*, repeated the information listed in CORE in CORE OPTIONAL also.
- **Clarified: 2.5.8 PRIVATE OWNER INDUSTRIAL STATUS.** Under *When collected*, repeated the information listed in CORE in CORE OPTIONAL also.
- **Modified: 2.5.11 DISTURBANCE 1.** Deleted code 55. Added codes 90 through 95.
- **Modified: 2.5.12 DISTURBANCE YEAR 1.** Added the *Values* 9999 that is currently in the text.

- Clarified: 2.5.23 PHYSIOGRAPHIC CLASS. Clarified code 33 by deleting "...sites in the Lake States with lowland swamp conifers or..."
- Added: 3.2 SUBPLOT/MACROPLOT STATUS. Added a code 4 defined as "QA crew did not measure trees, saplings, or seedlings. QA crew did measure all other data items (condition, boundary, and subplot-level data). For use only on check plots (QA STATUS = 2-6). Not a legal entry on production plots (QA STATUS = 1 or 7)".
- Added: 3.3 SUBPLOT NONSAMPLED REASON. Added a code 11 defined as "Ocean – Plot falls in ocean water below mean high tide line."
- Modified: 3.5 MICROPLOT CENTER CONDITION. Modified *When collected* from "All microplots where subplot center is CONDITION CLASS STATUS = 1, 2, 3" to "All microplots".
- Clarified: 3.6 SUBPLOT SLOPE. Clarified *Values* from "000 to 155" to "000, 005 to 155".
- Modified: 3.9 SUBPLOT/MACROPLOT CONDITION LIST (CORE OPTIONAL). Changed variable from CORE OPTIONAL to CORE. Also changed *When collected* from "All forested Phase 3 plots" to "All plots".
- Added: 4.2.2 PLOT TYPE. Added code 4 defined as "hectare plot boundary (coded from subplot 1 only)."
- Added: 4.2.7 CORNER DISTANCE. Added to *Values*: "hectare 001 to 185 ft". Also added leading zeros to other codes as appropriate and changed *Field width* from "2" to "3".
- Clarified: 5.14 TOTAL LENGTH. Under *When collected*, repeated the information listed in Phase 2 CORE OPTIONAL in Phase 3 CORE OPTIONAL also.
- Clarified: 5.15 ACTUAL LENGTH. Under *When collected*, repeated the information listed in Phase 2 CORE in Phase 2 CORE OPTIONAL and Phase 3 CORE.
- Clarified: 5.16 LENGTH METHOD. Under *When collected*, repeated the information listed in Phase 2 CORE OPTIONAL in Phase 3 CORE OPTIONAL.
- Modified: 5.20.3 DAMAGE SEVERITY 1 (CORE OPTIONAL). Changed the *Field width* from 2 digits to 1 digit.
- Modified: 5.22 MORTALITY YEAR (CORE OPTIONAL). Changed *Values* from "1995 or higher" to "1994 or higher".
- Modified: 5.26 MISTLETOE CLASS (CORE OPTIONAL). Changed the variable name from "MISTLETOE CLASS (CORE OPTIONAL) to "DWARF MISTLETOE CLASS (CORE OPTIONAL)".
- Modified: 7.2.1 CONDITION CLASS LIST. Changed *Field width* from 5 digits to 4 digits. Also changed the *Values* from "1 to 9 or 10000 to 98765" to "1000 to 9876".
- Modified: Appendix 2. FIA Forest Type Codes. Some codes were retired, some codes were added, and some forest types were reassigned to different codes:

Old Code	New Code	Forest Type
	128	Fraser fir
	129	red spruce/Fraser fir
	151	tropical pines
	172	Florida softwoods
181	171	Eastern redcedar
183	369	Western juniper
223	225, 226, 203	Jeffrey-Coulter-bigcone Douglas-fir divided to separate types
382		Delete Australian pine and aggregate with 995 exotic

Old Code	New Code	Forest Type
		hardwoods
	384	Norway spruce
	385	introduced larch
	391	other softwoods
	609	baldcypress/pondcypress
803	516	cherry-white ash-yellow-poplar
807	517	elm-ash-black locust
	903	gray birch
	905	pin cherry
925	971	deciduous oak woodland
926	972	evergreen oak woodland
932	933, 934	canyon-interior live oak divided to canyon live oak and interior live oak
	935	California white oak (valley oak)
951	961	Pacific madrone
952	973	mesquite woodland
953	974	cercocarpus (Mountain brush) woodland
954	975	intermountain maple woodland
955	976	misc. woodland hardwoods
	962	other hardwoods
981	983	palms
	989	other tropical hardwoods

Also, in the forest type descriptions, some descriptions were retired, some were added, and some were modified. See the change proposal for a complete list.

- **Added: Appendix 3. FIA Tree Species Codes.** Added several new species based primarily in west Texas, codes 0060, 0061, 0141, 0223, 0363, 0523, 0851, 0867, 0868, 0869, 0870, 0911, 5491, 8511, 8512, 8513, 8514, and 8651.
- **Added: Appendix 3. FIA Tree Species Codes.** Added common name columns for species in the North, South, Rocky Mountain, and Pacific Northwest regions to national field guide version.
- **Clarified: Appendix 6. Glossary.** Clarified the definitions of the following terms: blind check, cold check, hot check, production plot, reference plot, and training plot. Also added a definition for the term 'botched plot'.
- **Changed: Appendix 8. Tree Coding Guide for RECONCILE.** Changed the title of Appendix 8 from "Tree Coding Guide for RECONCILE" to "Tree Coding Guide".
- **Modify PLOT STATUS.** Deleted codes 4 (Landcleared) and 5 (Intensifications)
- **Modify PLOT NONSAMPLED REASON.** Change reason "Out of State" to code 10.
- **Modify SAMPLE KIND.** Deleted codes 8 and 9.
- **Modify GPS UNIT.** Deleted codes 8 and 9. Create regional variable SRS GPS STATUS.
- Deleted HORIZONTAL DISTANCE TO URBAN OR BUILT-UP LAND.
- Deleted HORIZONTAL DISTANCE TO AGRICULTURAL LAND.
- Deleted NUMBER OF TREE ENTRIES.

- Deleted NUMBER OF PRISM POINTS REMEASURED.
- Deleted NUMBER OF SUBPLOT CENTERS REVERTED.
- Delete CRUISER NUMBER and ASSISTANT CRUISER NUMBER(S) (replaced with national code CREW NUMBER).
- Modify CONDITION NONSAMPLED REASON. Change rease “Out of State” to code 10.
- Modify TREATMENT. Deleted codes 11 – 15. Create regional variable SRS CUTTING TYPE.
- Modify PRESENT LAND USE. Add code 17 – Windbreak, 43 – Beach, 45 – Nonforest/chaparral. Changed codes 41 – Marsh to Nonvegetated and 42 – Beach to Wetland.
- Modify STAND STRUCTURE. Deleted Two-storied and changed Multi-storied to code 2.
- Modify SUBPLOT STATUS. Deleted code 9.
- Modify SUBPLOT NONSAMPLED REASON. Change reason “Out of State” to code 10.
- Delete ENTRY NUMBER.
- Delete PRISM POINT #/TREE #.
- Delete OLD MICROPLOT STATUS.
- Delete PRISM TREE STATUS.
- Modify RECONCILE. Deleted code 0 – New offset microplot sapling.
- Modify SPECIES. Deleted codes 780, 781 and 782. Created regional variable SRS SPECIES CODE.
- Modify LENGTH METHOD. Deleted code 4 – Total generated in the office. Create regional variable SRS ABNORMAL TERMINATION.
- Modify CAUSE OF DEATH. Deleted codes 81, 82 and 83.
- Renam FUSIFORM/COMANDRA RUST/HARDWOOD DIEBACK INCIDENCE to SRS DISEASE.
- Delete SITE TREE NUMBER.

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## FOREST INVENTORY AND ANALYSIS NATIONAL CORE FIELD GUIDE

### VOLUME I: FIELD DATA COLLECTION PROCEDURES FOR PHASE 2 PLOTS

Version 4.0

#### Version History:

- 1.1 March 1999 (first version implemented, Maine, 1999)
- 1.2 August 1999
- 1.3 September 1999 (revised from Bangor, ME Data Acquisition Band meeting, Aug 1999)
- 1.4 February 2000 (revised from Charleston, SC Data Acquisition Band meeting, Dec 1999)
- 1.5 January 2001 (revised from Portland, OR Data Acquisition Band meeting, Sept 2000)
- 1.6 March 2002 (revised from Tucson, AZ Joint Band meeting, Jan 2002)
- 1.7 February 2003 (revised from Charleston, SC Joint Band Meeting, Feb 2003)
- 2.0 April 2003 (revised from Atlantic City, NJ, Data Acquisition Band Meeting, Mar 2003)  
October 2003 (revised from Anchorage, AK, Data Acquisition Band Meeting, Aug. 2003)  
January 2004 (revised from Data Acquisition Band conference calls with FIA Management Team Approval)  
August 2004 (revised from Asheville, NC, Data Acquisition Band Meeting, Aug. 2004)
- 3.0 October 2005 (revised from change management process, change proposals approved by FIA Management Team, from Asheville, NC, Data Acquisition Meeting, Aug. 2004, and from Las Vegas, NV, Data Acquisition Meeting, Mar. 2005)
- 4.0 October 2007 (revised from change management process, change proposals approved by FIA Management Team, from Flagstaff, AZ, Data Acquisition Band Meeting, Sept. 2006, and from multiple Data Acquisition Band conference calls)

Mention of trade names or commercial products does not constitute endorsement or recommendation for use.

## INTRODUCTION

This document describes the standards, codes, methods, and definitions for Forest Inventory and Analysis (FIA) field data items. The objective is to describe CORE FIA field procedures that are consistent and uniform across all FIA units. **This CORE is the framework for regional FIA programs; individual programs may add variables, but may not change the CORE requirements.** Unless otherwise noted, the items in this field guide are considered CORE, that is, the information will be collected by all FIA Units as specified. Items or codes specified as CORE OPTIONAL are not required by individual units; however, if the item is collected or coded, it will be done as specified in this field guide. It is expected that on average all items in Volume I can be measured by a two-person field crew in less than one day, including travel time to and from the plot.

This document also describes additional regional standards, methods and definitions for the southern FIA unit. This serves to enhance the National CORE, not change it. All regional items and clarifying text are shaded in the same manner as this paragraph. Variables or codes not collected in the field by the Southern Research Station will appear as light gray text when printed (example text).

The FIA program is in transition, changing in response to legislation and new customer demands. One of these demands is for increased consistency, which this field guide begins to address. Another change was the merger of the FIA program with the field plot component of the Forest Health Monitoring (FHM) program's Detection Monitoring. A systematic grid was established that includes some, but not all former FIA plots. This grid contains the Phase 2 plots, the annual survey plots that are designed for measurement on a rotation such that a portion of the plots are measured each year. The rotation length varies by region. The former FHM Detection Monitoring field plots are the Phase 3 plots, a subset of the Phase 2 plots. The same basic plot and sampling designs are used on all the plots.

The focus of Volume I is on data that are collected in the field on all Phase 2 plots in the FIA sample. The methods in Volume I are also used on Phase 3 plots except when specifically noted otherwise in the methods text. Volume II of the series describes an additional, expanded suite of data collected on

the Phase 3 subset of plots. Volume II contains methods for the following indicators: ozone bioindicator plants; lichen communities; soils (physical and chemical characteristics); crown condition; vegetation diversity and structure; and down woody material. Volume III of the series (in preparation) will document the office procedures including data elements measured in the office, data from other sources that are merged into the FIA database, and CORE compilation and analysis algorithms. When complete, the three-volume set will describe the CORE FIA program field data, all of which are measured consistently across the country.

## FIELD GUIDE LAYOUT

Each section of the field guide corresponds to one of the following sections:

- 0 General Description
- 1 Plot
- 2 Condition
- 3 Subplot
- 4 Boundary
- 5 Tree Measurements
- 6 Seedling
- 7 Site Tree

Each section begins with a general overview of the data elements collected at that level and background necessary to prepare field crews for data collection. Descriptions of data elements follow in this format:

DATA ELEMENT NAME -- <brief variable description>

When collected: <when data element is recorded>

Field width: <X digits>

Tolerance: <range of measurement that is acceptable>

MQO: <measurement quality objective>

Values: <legal values for coded variables>

Data elements, descriptions of when to collect the data elements, field width, tolerances, MQO's, and values, apply to both Phase 2 plots (formerly called FIA plots) and Phase 3 plots (formerly called FHM Detection Monitoring plots) unless specifically noted. Field width designates the number of columns (or spaces) needed to properly record the data element.

Tolerances may be stated in +/- terms or number of classes for ordered categorical data elements (e.g., +/- 2 classes); in absolute terms for some continuous variables (e.g., +/- 0.2 inches); or in terms of percent of the value of the data element (e.g., +/- 10 percent of the value). For some data elements, no errors are tolerated (e.g., PLOT NUMBER).

MQO's state the percentage of time that the collected data are required to be within tolerance. Percentage of time within tolerance is generally expressed as "at least X percent of the time," meaning that crews are expected to be within tolerance at least X percent of the time.

PLOT NOTES will be available on every PDR screen for ease in recording notes.

## UNITS OF MEASURE

The field guide will use ENGLISH units as the measurement system.

Plot Dimensions:

### Macroplot:

Radius = 58.9 feet

Area = 10,899 square feet or 0.25 acre (ac) or 1/4 acre

**Subplot:**

Radius = 24.0 feet  
 Area = 1,809.56 square feet or approximately 0.04 acre or approximately 1/24 acre

**Microplot:**

Radius = 6.8 feet  
 Area = 145.27 square feet or approximately 0.003 acre or approximately 1/300 acre

**Annular plot:**

Radius = from 24.0 feet to 58.9 feet  
 Area = 9088.4 square feet or approximately 0.21 acre or 5/24 acre

The distance between subplot centers is 120.0 feet horizontal.  
 The minimum area needed to qualify as accessible forest land is 1.0 acre.  
 The minimum width to qualify as accessible forest land is 120.0 ft

Tree Limiting Dimensions:

breast height	4.5 ft
stump height	1.0 ft
merchantable top	4.0 in DOB
merchantable top for woodland	1.5 in DOB
minimum conifer seedling length	0.5 ft
minimum hardwood seedling length	1.0 ft
seedling/sapling DBH/DRC break	1.0 in DOB
sapling/tree DBH/DRC break	5.0 in DOB

**0.0 GENERAL DESCRIPTION**

The CORE field plot consists of four subplots approximately 1/24 acre in size with a radius of 24.0 feet. The center subplot is subplot 1. Subplots 2, 3, and 4 are located 120.0 feet horizontal (+/- 7 feet) at azimuths of 360, 120, and 240 degrees from the center of subplot 1, respectively (see Figure 1). Throughout this field guide, the use of the word 'plot' refers to the entire set of four subplots. 'Plot center' is defined as the center of subplot 1. As a CORE OPTION, the field plot may also include macroplots that are 1/4 acre in size with a radius of 58.9 feet; each macroplot center coincides with the subplot's center. Macroplots are numbered in the same way as subplots.

If the macroplots are not installed, the subplots are used to collect data on trees with a diameter (at breast height, DBH, or at root collar, DRC) of 5.0 inches or greater. If the macroplots are installed, then subplots are used to collect data on trees from a diameter 5.0 inches to the breakpoint diameter and the macroplot is used to collect data on trees with diameter greater than the breakpoint diameter.

Each subplot contains a microplot of approximately 1/300 acre in size with a radius of 6.8 feet. The center of the microplot is offset 90 degrees and 12.0 feet horizontal (+/- 1 foot) from each subplot center. Microplots are numbered in the same way as subplots. Microplots are used to select and collect data on saplings (DBH/DRC of 1.0 inch through 4.9 inches) and seedlings (DBH/DRC less than 1.0 inch in diameter and greater than 0.5 foot in length [conifers] or greater than 1.0 foot in length [hardwoods]). Note: Longleaf pine must be at least 0.5 inch at the root collar. Planted seedlings must meet the same size requirements listed above.

As a CORE OPTION for a Phase 2 plot that is not part of the Phase 3 subset, data for one or more of the Phase 3 indicators may be collected on the plot. If a region exercises the option to collect one or more Phase 3 indicator(s) on a Phase 2 only plot, the entire suite of measurements for the particular indicator(s) described in the appropriate chapter must be collected for the data for that indicator to be core optional.

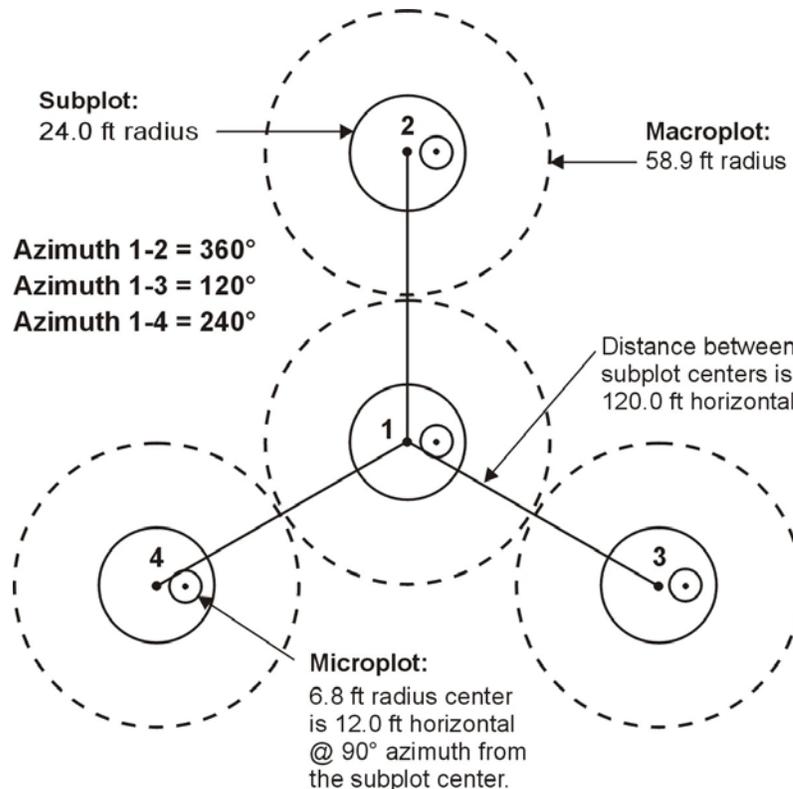
Each unit may choose which Phase 3 indicators to collect as core optional on a Phase 2 plot that is not a Phase 3 plot. They may choose no indicators, all indicators or a subset. If they choose to collect data for a Phase 3 indicator, all the procedures for the indicator must be followed for that indicator to be considered core optional (data in National NIMS). If a subset of measurements for an indicator are collected, that is considered a regional enhancement and the data will be in the regional database.

Macroplots may be used to provide a better sample of rare population elements, such as very large trees.

The annular plot may be used for destructive sampling such as collecting soil samples. Also the term annular plot will be used for instructions in the field guide, for example, instructions on numbering trees when the macroplots are installed.

Data are collected on field plots at the following levels:

Plot	Data that describe the entire cluster of four subplots.
Subplot	Data that describe a single subplot of a cluster.
Condition Class	A discrete combination of landscape attributes that describe the environment on all or part of the plot. These attributes include CONDITION CLASS STATUS, RESERVED STATUS, OWNER GROUP, FOREST TYPE, STAND SIZE CLASS, REGENERATION STATUS, and TREE DENSITY.
Boundary	An approximate description of the demarcation line between two condition classes that occur on a single subplot, microplot, or macroplot. There is no boundary recorded when the demarcation occurs beyond the fixed-radius plots.
Tree	Data describing saplings with a diameter 1.0 inch through 4.9 inches, and trees with diameter greater than or equal to 5.0 inches
Seedling	Data describing trees with a diameter less than 1.0 inch and greater than or equal to 0.5 foot in length (conifers) or greater than or equal to 1.0 foot in length (hardwoods).
Site Tree	Data describing site index trees.



**Figure 1. FIA Phase 2 plot diagram. See individual Phase 3 chapters for Phase 3 plot figures.**

## 0.1 PLOT SETUP

Plots will be established according to the regional guidelines of each FIA unit. Mark each subplot and microplot center with a wire pin. Bend the subplot center pin in a “horseshoe” shape. Bend the microplot center pin in a “pigtail” shape. Place pins at all subplot and microplot centers that contain an accessible forest condition, even if there is no tally on the subplot or microplot. When the crew cannot occupy the plot center because safety hazards exist, or the plot center is inaccessible or out of the sample, the crew should check the other subplots. If any subplot centers can be occupied and are in the sample, the subplots that can be occupied should be established and sampled following normal procedures. **When a subplot center or microplot center cannot be occupied, no data will be collected from that subplot or microplot; instead, the entire subplot or microplot should be classified according to the condition preventing occupancy (i.e. CONDITION CLASS STATUS 4 [census water] or 5 [nonsampled])**

The following table provided can assist in locating subplot 2-4 from a subplot other than subplot 1.

Subplot From	Subplot Numbers To	Azimuth <i>degrees</i>	Backsight	Distance <i>feet</i>
2	3	150	330	207.8
2	4	210	030	207.8
3	4	270	090	207.8

If a subplot was installed incorrectly at the previous visit, the current crew should remeasure the subplot in its present location and contact the field supervisor. In cases where individual subplots are lost (cannot be relocated), use the following procedures:

- Assign the appropriate present CONDITION CLASS STATUS Code(s) to the new subplot (usually CONDITION CLASS STATUS = 1 or 2).
- Assign TREE STATUS = 0 to all downloaded trees (i.e., incorrectly tallied at the previous survey).
- Assign RECONCILE codes 3 or 4 (i.e., missed live or missed dead) to all trees on the new subplot.
- Assign the next TREE RECORD NUMBER.

When a plot is remeasured, the status of the offset microplot will be indicated in both the data recorder program and on the past data printout. If the microplot status is listed as “NEW”, the offset microplot was not installed in the previous inventory and the cruiser should install a new microplot. All saplings on the new offset microplot should be assigned RECONCILE code 3 (missed live). If the status is listed as “REMEASURE”, the offset microplot was installed in the previous cycle and should be remeasured normally.

## 0.2 PLOT INTEGRITY

Each FIA unit is responsible for minimizing damage to current or prospective sample trees and for specifying how these trees are monumented for remeasurement. The following field procedures are permitted:

- Scribing and nailing tags on witness trees so that subplot centers can be relocated.
- Boring trees for age on subplots and macroplots to determine tree age, site index, stand age, or for other reasons.
- Nailing and tagging trees on microplots, subplots, and macroplots so that these trees can be identified and relocated efficiently and positively at times of remeasurement.
- Nailing, scribing, or painting microplot, subplot, and macroplot trees so that the point of diameter measurement can be accurately relocated and remeasured.

All other potentially damaging procedures that may erode subplot integrity are prohibited. The following practices are specifically prohibited:

- Boring and scribing some specific tree species that are known to be negatively affected (e.g., the initiation of infection or callusing).
- Chopping vines from tally trees. When possible, vines should be pried off trunks to enable accurate measurement. If this is not possible, alternative tools (calipers, Biltmore sticks) should be used.

### **0.3 OWNERSHIP INFORMATION**

Ownership information is to be recorded on all accessible forest land conditions. Prior to actual fieldwork in a county, ownership data is collected from county courthouse records. It is important to gather as much information as possible on the initial visit to the courthouse to avoid a return visit while the fieldwork is occurring.

**NOTE:** If the ownership has changed either from or to National Forest, the state coordinator or field supervisor must be notified.

#### **SURVEY SYSTEMS**

There are two primary boundary surveys: metes-and-bounds and Public Land Survey (PLS). The metes-and-bounds method uses map and parcel whereas the PLS uses section, township, and range to describe boundaries. Field crews should become familiar with the method used in their respective state.

#### **INITIAL COUNTY OVERVIEW**

Review the county materials to determine which plots were forested on the previous survey. Also, determine if any of the plots were recorded as idle farmland, which may have reverted since the last inventory. In addition, examine the aerial photographs/imagery to determine other plot locations that may have reverted and/or partially sample forest land. Be sure to collect ownership information on these plots. Owner data is not required on nonforest plots.

#### **COUNTY RECORDS**

Record keeping systems varies both between and within states. Some counties are highly computerized, while some rely totally on paper. Some counties have up-to-date information, while others are outdated. It is always advisable to ask for help from courthouse employees. They are there to help the public and are generally eager to assist people. They can also be invaluable sources of information for local forest industries.

#### **GENERAL OWNERSHIP PROCEDURES:**

1. Determine if the plot location samples forest land. Keep in mind the plot layout. One or more of the subplots may sample forest land. This is where preliminary work is beneficial.
2. Locate the plot location on county courthouse tax maps using the aerial photograph. When available, rely primarily on the old photograph to locate the plot on the county tax maps. Also use the plot sketch from the previous survey. It may show distinguishing physical characteristics that may help delineate the ownership boundaries. If there is more than one parcel in the vicinity of the plot, record information for each possible parcel. The adjacent tract may be in another owner category or may help you gain access to the plot.
3. Record the name, address, and owner class for the owner of each parcel. Cross check the owner with the past survey to verify an actual ownership change or if either the current or previous assignment was in error.
4. Determine the total acreage of each parcel and the number of forest acres, if required. Woodland acres are broken out of the total acreage in some states and can be used to determine percent forest. In other states, however, pine plantations are included in the agriculture category. In these cases, use the aerial photograph/imagery and the field visit to estimate the percent forest of the tract. Field check the percent forest information when the plot appears to have been planted, naturally reverted, or land cleared.

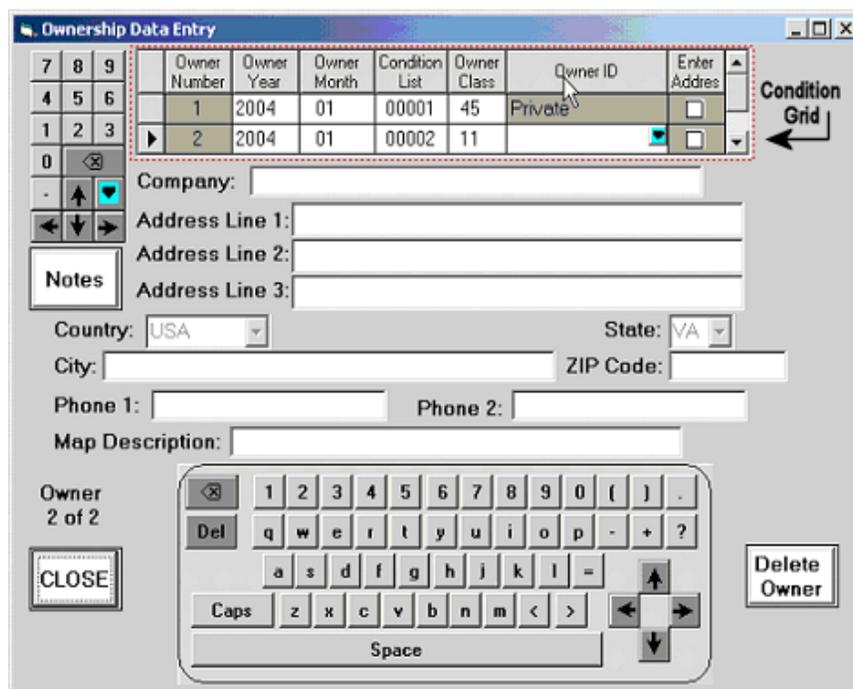
5. Record all pertinent ownership information on the “Forest Land Ownership Classification” sheets and the “Sample Location Reference Page.” In addition, the ownership information must also be recorded in the data recorder program. The following provides instruction on entering the ownership data in the National Tally Program (NaTally).

**0.3.1 OWNERSHIP DATA ENTRY**

The ownership data entry function of the National Tally Program (NaTally) will be used to enter ownership information for all forested conditions on a plot. That data collected is no different than what cruisers have previously collected in the County Courthouse. Cruisers are still expected to collect the ownership information on paper at the courthouse. This required data will then be entered via NaTally and transmitted with the plot information. The plot will not pass the final edit unless the ownership data entry function is completed.

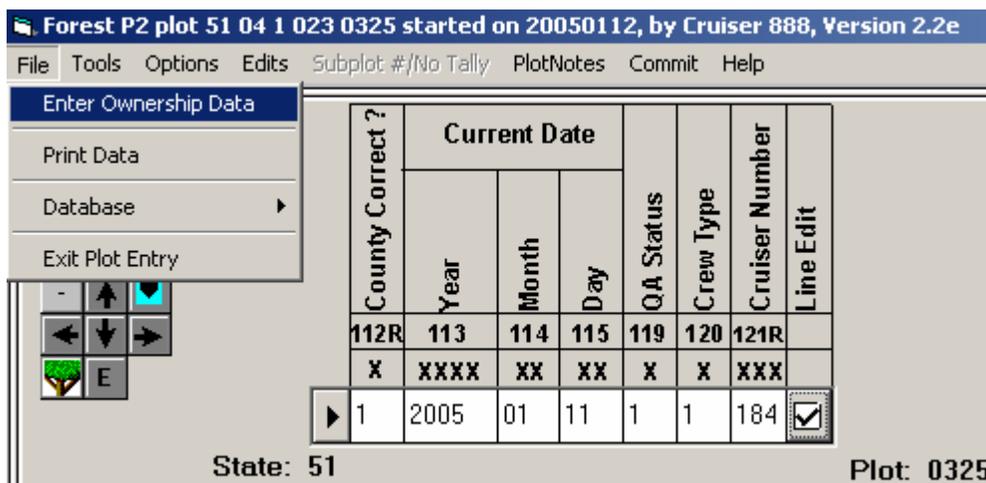
**0.3.2 UNDERSTANDING THE OWNERSHIP DATA ENTRY WINDOW**

The Ownership Data Entry window is comprised of four major sections. The first two are the keyboard and numeric keypad. Both are the same as in the NaTally plot entry program. The two new sections are the Condition Grid at the top of the window and the Address Information Grid located in the middle of the window.



**0.3.2 ENTERING OWNERSHIP INFORMATION**

To begin entering ownership information, open the plot in NaTally.  
 Select “Enter Ownership Data” from the ‘File’ dropdown menu. This will open the Ownership Data entry form.

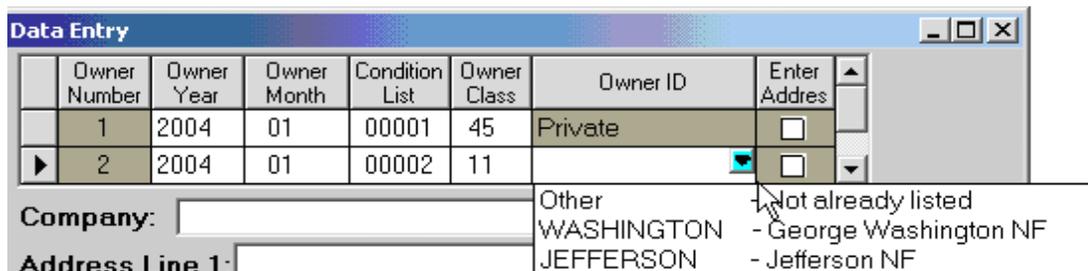


Enter the condition information one Owner Class at a time into the Condition Grid.

**Required Fields:**

- Owner Year: The year in which the ownership information was collected.
- Owner Month: The month in which the ownership information was collected.
- Condition List: List of conditions owned by owner X.
- Owner Class: Variable that classifies land into fine categories of ownership.
- Owner ID: Delineation of owner class code.

Note: When Owner Class 45 (individual) is entered, the Owner ID is filled Private. When Owner Class other than 45 is entered a selection must be made from the dropdown menu for Owner ID.



Select the 'Enter Address' check box to access the Address Information Grid for that condition.

Enter data into the Address Information Grid

Once the 'Enter Address' check box is selected, the cursor will jump to the Company or Name box depending on which owner class is selected.

To move around the Address Information Grid:

- Use the Up and Down arrows to tab between cells
- Use the Left and Right arrow to move within cells

With Owner Class 45 selected:

**First Name:** The owner's first name. This line should include all information about the owner's name except the last name of the last ownership record listed and any suffixes attached to the last name of the last ownership record.

**Last Name:** The owner's last name. This field should contain the last name of the last person listed as the ownership of record and any additional suffixes that are included with that person's name.

If an Owner Class selected is other than 45 the Company will need to be filled in.

Company: Company or agency. The company, government, government agency, or other organization that is the ownership of record (i.e., is recorded in the tax office).

Regardless of Owner Class, the following information will need to be recorded.

Address Line 1: The first line of the owner's address. This line can contain a person's name if the address is "in care of" (c/o), "attention to" (attn:) or a similar situation.

Note: If a company name is entered and there is contact information for an individual within a company, then enter that person's name into Address Line 1.

Address Line 2: The second line of the owner's address.

Address Line 3: The third line of the owner's address.

If no information exists for Address Lines 2 or 3, skip these sections and move to Country and State.

Country: The country of the owner's address. USA is the default country; other countries can be selected from the dropdown menu if appropriate. Province and Country are required only for owners who reside outside of the United States.

State: The state of the owner's address. The state the plot was collected in is automatically selected. If the owner is from another state, select it from the dropdown menu.

City: The city of the owner's address.

Zip Code: The zip code of the owner's address.

Phone 1: The primary phone number that should be used to contact the owner.

Phone 2: The secondary phone number that can be used to contact the owner.

Note: If no contact information exists, Phone 1 and Phone 2 can be left blank.

Notes can be added for each Owner Number. To do so, select the owner and select the NOTES button below the numeric keypad. This will bring up the NOTES form where additional information can be added. Be sure that the owner number at the top of the notes form matches the owner number from the condition grid.

The final piece of information required in the Address Information Grid is the Map Description. Depending on the state either map and parcel data or township and range data will be entered. This field cannot be left blank or an error will be generated at the final plot edit.

The map description can be recorded in one of two formats depending on the state and county. The

Township & Range format should be recorded in the following format:

Tx Rx Sx (Where x = recorded value T = Township R = Range S = Section)

The Map & Parcel format should be recorded in the following format:

Mx Px (Where x = recorded value M = Map # P = Parcel #)

If the information provided at the county courthouse does not follow one of these two formats, record the data in a logical format and comment in the notes how it was recorded.

Once the information is complete for the particular owner, go back to the Condition Grid and select the check box for the next condition. Complete the Address Information Grid for each forested condition. When completed select the CLOSE button in the lower left of the form.

Once back at the plot form, run a final plot edit. Correct errors if necessary. If there are no errors, the plot is ready for transmittal.

### 0.3.3 DELETING AN OWNER RECORD

If an owner is entered by mistake and needs to be removed, the owner record should be deleted. To do this, select the row selector arrow in the Condition Grid and the Delete Owner button in the lower right of the form. A message box will appear, select 'YES'.

	Owner Number	Owner Year	Owner Month	Condition List	Owner Class	Owner ID	Enter Address	
	1	2004	01	00001	45	Private	<input type="checkbox"/>	
▶	2	2004	01	00002	31		<input type="checkbox"/>	

### 0.3.4 PRINTING OWNERSHIP INFORMATION

To print the ownership information, select print from the file menu in NaTally. Deselect "All Data" and select "Ownership". Click Print button.

Example Printout:

Forest P2 plot 51 04 1 023 0325 started on 20050112, by Cruiser 888, Version 2.2e

Date Printed: 20050119  
 Edited?: No

Printed by: 034  
 Transmitted?: No

#### OWNERSHIP

Owner #:1 Owner Year:2004 Owner Month:01 Condition List:1 Owner Class:45 Owner ID:Private

Company:

First Name: Johnny  
 Last Name: Walker  
 Address Line 1: 1234 FIA ST.  
 Address Line 2:  
 Address Line 3:  
 Country: USA Province:  
 City: Knoxville State: TN ZIP Code: 37919  
 Phone 1: 865 862 2000 Phone 2:  
 Map description: M34 P6.01

Owner #:2 Owner Year:2004 Owner Month:01 Condition List:2 Owner Class:11 Owner ID:WASHINGTON

Company: George Washington NF

First Name:  
 Last Name:  
 Address Line 1: 1720 Peachtree St  
 Address Line 2: Suite 760S  
 Address Line 3:  
 Country: USA Province:  
 City: Atlanta State: GA ZIP Code: 30309  
 Phone 1: Phone 2:  
 Map description: T3 R5 S21

### 0.3.6 EDIT CONSTRAINTS

Every condition in the Condition Grid must be forested.

Every forested condition must appear in the Condition Grid.

A condition can only appear once in the Condition Grid. There can not be 2 owners for 1 condition.

A warning will be generated is there is an owner with a different tract size or percent forest.

**0.4 LOCATING SAMPLE PLOTS**

Each crew should always consider weather forecasts, water levels, plot access, and state and corporate cooperation when working a county. Each county should be worked in the most efficient manner possible. Always contact National Forest System (NFS) district and county forest offices, and county sheriff, as soon as you enter the county. Contact the landowner and always let local people know who you are and what you are doing when leaving an official vehicle near a residential area.

STOP AT HOUSES, KNOCK ON DOORS, ETC. DO NOT DRIVE ACROSS CROPLAND, WILDLIFE CLEARINGS, YARDS, ETC. UNLESS YOU HAVE PERMISSION FROM THE LANDOWNER. PARK THE VEHICLE AND WALK. "POPPING" A LOCK OR USING A MASTER KEY WILL NOT BE TOLERATED. IF A ROAD HAS WATER-BARS OR A CABLE WITH A LOCK DO NOT DRIVE ON IT.

**Fill out a sample location sheet (draw sheet) for all forested plots and non-forest plots whenever a non-forest plot has adjacent forestland close to the plot. This will insure that all 4 subplots are completely and totally within the non-forest condition. This will aid cruisers in the next survey to identify those plots that may have started to revert, but did not meet the required minimum stocking. In addition, this will allow check cruisers to know exactly where PC was located in relation to the adjacent forestland. If a sample location sheet is filled out for a non-forest plot, then label "Non-Forest Aid" at the top of the sample location sheet. A sample location sheet is not required for intensification plots, although data from intensification plots are recorded in the data recorder or on hardcopy.**

Each crew will be furnished with both new and old photos (when available), plot sheets, ownership and field classification sheets, county maps, and National Forest ownership maps. All non-forest plots and possible reversions (a sample location or a portion of a sample location that was non-forest in the previous inventory but now forest) must be chained in using the old photo pinprick. Correct the pinprick on the new photo/imagery after the field visit if needed. For intensification plots, only use the new photos/imagery. Do not make any corrections to the new photo/imagery for an intensification plot.

**ACCESS TO STARTING POINT (SP)**

In the Sample Location Sheet (draw page) section "SP Sketch" sketch a map of the route used to access the SP. Include location of the landowners' house, road names and numbers, obvious landmarks, and other prominent features that will aid the next field crew to locate the SP. Both the SP and PC should be clearly marked on the sketch map.

Starting Point

Select a permanent landmark or physical feature as the SP for locating the sample location. Intersections or sharp bends in roads, streams, or drainage ditches, field corners, prominent trees, and other features which can be readily identified both on the ground and on the photo make good starting points. The ideal starting point tree is a healthy, unique species, with unusual form, in a prominent location. At remeasurement relocations, the starting point on the old location sheet can often be used again. Scribe the SP tree with an "X" well above DBH (or well below depending on topography) and tag the tree at ground level, facing plot center.

Complete a new draw page with the prior starting point information on land clearings, possible reversions that are chained into that do not meet minimum stocking levels, and on non-forest plots that are close to being partial plots and label "Non Forest Aid" at the top of the new sample location sheet. Copy the starting point information off the old sheets for any non-forest plots when the previous cruiser recorded the information. A starting point is not necessary if the plot center was non-forest during the past survey and all four subplots are obviously non-forest at the present time.

Note: No mark is needed on an SP if the point is permanent and readily identifiable, such as the corner of a building or a road intersection. Reference a tree when possible. **Do not scribe an SP in people's yards, on hiking trails or elsewhere where unsuitable. In these situations scribe the backside of the SP if possible and put a note stating that the SP was either placed on the backside of the tree or not scribed at all.**

**PHOTO WORK/IMAGERY**

New imagery (Digital Ortho Photos or DOQ/DOQQ) is currently being printed on paper using a color laser printer. When making any notation on the imagery a ball point or rolling ball pen should be used. Felt tip-type pens (such as Sharpies) may dissolve the ink on the DOQ and should be avoided.

On revisited plots the cruiser must compare the coordinates on the new imagery to the previous crew's coordinates downloaded from the data recorder program. If the coordinates are the same and are verified to be within 50 feet of the actual plot location on the ground then new coordinates do not need to be taken and plot center can be pinpricked or marked, or crews may use the new imagery crosshairs to identify plot center. In this instance, crews should enter GPS STATUS = 8 (see 1.27).

On revisited plots where the previous crew's coordinates are **not** within 50 feet of the actual plot location on the ground then a reference azimuth, angle of intersection, and azimuth to plot center are drawn on the new imagery to aid in the establishment of an accurate course to sample location, verify placement of the pinprick for plot center, and ground check the office photo interpretation. Note any corrected pinpricks on the front and back of the new imagery. Crews should enter GPS STATUS = 1. (see 1.27).

In instances where it is impractical to draw up the new imagery due to the absence of an easily accessible reference line or none exist on the imagery (i.e. large areas of marsh and water) and the plot center location on the new imagery and the old photography/imagery can be positively identified as being in the same location on the ground, then use the coordinates that are located on the new imagery. In addition, verify that the coordinates on the new imagery are within the 50 foot tolerance of the previous crew's coordinates. If so, use the previous crew's coordinates. If the previous crews coordinates are **not** within the 50 foot tolerance of the previous crews coordinates and it is impractical to draw up the new imagery contact your field supervisor or state coordinator.

In instances where the crew cannot duplicate the plot center when drawing up from the old photography/imagery to the new imagery due to inaccuracy of older photography (i.e. areas of high relief, on edges of photography, or etc.) then pinprick/mark the new imagery as close as possible to the old photography/imagery and use draw up procedures to collect a new coordinate from the new imagery. It is advisable to contact your field supervisor or state coordinator before you proceed to insure accuracy.

All plots established for the first time must be drawn up on the new imagery to verify correct plot location and must include a reference azimuth, angle of intersection, and azimuth to plot center.

It is advisable to be within 2000 feet of the plot center when drawing up photography/imagery to reduce error if possible.

### **Reference Azimuth**

For a reference azimuth, select a straight road section, drainage ditch, field edge, or draw a line between two well-spaced landmarks. Avoid standing near metal objects, e.g., railroads, bridges, or power line towers, since they can influence the compass reading.

Measure the reference azimuth with a compass to the nearest degree and record on the tally sheet under starting point notes, disregarding magnetic declination. If no linear features exist on the photo/imagery, GPS coordinates of two point features can be used to obtain a reference azimuth. Prior to driving to the sample location, identify two distinct features on the photo/imagery within a reasonable distance (usually 1-2 miles) from the sample location. At each point feature, record 180 fixes in averaging mode on the GPS receiver (GPS can only be utilized when error falls below +/- 70 feet). The reference azimuth, based on magnetic north, is determined by using the distance feature in the GPS unit.

If the reference azimuth line and the azimuth to plot center do not intersect on the photo/imagery, draw a line perpendicular to the reference azimuth line making it cross the azimuth to plot center. Use the perpendicular as the new reference azimuth line after adding or subtracting 90.

### Angle of Intersection

With a protractor measure the interior angle between the reference azimuth and azimuth to plot center arrows to the nearest degree. The interior angle should be between 20 degrees and 90 degrees. Record the angle on the draw page under starting point notes.

### Photo/Imagery Notation

Note the following information on the **front** of the new photograph/imagery for all plots when applicable:

- Reference azimuth line with an arrow indicating direction and azimuth noted.
- Course to plot azimuth line with an arrow indicating direction and azimuth noted.
- Starting Point circled and indicated as SP. **All plots**
- GPS Way Point circled and indicated as WP for completely non-forest plots only.
- Interior angle noted with arrows drawn to the azimuth lines.
- Note which plots have corrected pinpricks.

Note the following information on the **back** of new photographs/imagery when plot center is nonforest (e.g., partials and completely nonforest plots) or when the plot is completely inaccessible.

- a. Plot number, if not already noted.
- b. Land use code at plot center. If land use is a hayfield, record cropland land use (11) and write "hay" next to the code number. If the land use is Agricultural Land (10), developed (30-34) or Other Nonforest (40), then write a short description of the type of development, e.g., "back yard", "grocery store", "barn", etc. This will aid the next crew to ensure the same area is re-evaluated.
- c. Date (mm/dd/yyyy).
- d. Cruiser and assistant initials and codes.
- e. Circle and note the "correct" pinprick if a correction has been made
- f. GPS coordinates (optional)
- g. Note on the back of the new photograph/imagery when plot center has reverted or been landcleared.
- h. If a plot is nonforest but a draw sheet is filled out due to the proximity of forest land to one or more subplots, then record 'See Nonforest Aid' on back of photo.

### Course to plot

The course to sample location can be determined by measurements from the photo/imagery for new plot locations, reversions, partials, or land clearings and lost plots when the SP has been removed. The azimuth and distance can be determined using GPS, **if further than 500 feet**, or by using compass and chain. Pacing to most locations is possible unless underbrush, water, or rough topography make pacing impractical. Pacing between SP and PC can be used to verify a previously reported course to sample location, but not for establishing a plot.

When old starting points are used at remeasurement locations, use the same distance and azimuth recorded in the previous survey with corrections necessary to account for declination and errant distances recorded by the previous crew. Accurate measurement of azimuth and distance from SP to PC can be by GPS navigation when the distance exceeds 500 feet or by traversing on the ground.

### **ESTABLISHMENT OF SAMPLE KIND 1 LOCATIONS USING GPS**

To begin, manually enter the plot coordinates in the GPS unit. Using the GPS, navigate to within 100' – 150' of the plot. If possible, locate a good SP. Set the GPS down and take a new coordinate in the averaging mode. Again, you must collect at least 180 hits for the coordinates to be accurate. Once the GPS has reached at least 180 hits, store the current position as a waypoint. Using the distance function in the GPS unit, calculate the course to plot based on these two coordinates. At this point, chain the remaining horizontal distance and azimuth to establish plot center. Once you are at PC, collect a new coordinate for the plot. Again, take at least 180 hits. Record these coordinates as the new plot coordinates in the data recorder.

## WITNESS TREES

Reference two witness trees to subplot 1 when at all possible. In the absence of trees, use distinct objects such as fence corners, boulders, etc. If another subplot is referenced, be sure to note which subplot is monumented with witness trees.

Witness trees should be:

1. Close to the pin and spaced approximately at right angles from the pin
2. Not likely to die or be cut within 5-7 years, e.g., pine sawtimber
3. A species easily located in the stand
4. At least 5 inches DBH (At least 2 inches DBH if no 5 inch DBH trees are present)
5. If there are no witness trees, use whatever is available near the subplot center and describe its' relationship to the pin (e.g., large down log that you can tag, a large rock, etc.) and describe these on the sample location reference page.

Witness tree data:

- a. Species
- b. DBH to the last 0.1 inch
- c. Azimuth from pin to center of tree at ground level
- d. Horizontal distance to 0.1 ft from pin to center of tree

Mark the base of each witness tree with a metal tag (3 to 4 inches long) facing plot center. Scribe an "X" well above DBH facing the pin and be careful not to penetrate the cambium. **Do not scribe or place a white tag on trees in people's yards, picnic areas, etc.** Be sure to note on the draw page if you did not scribe and/or tag the trees.

Mark one of the witness trees with a designated tag (Venetian blind material) by nailing the tag at approximately six feet (or at a location easily viewed when navigating to the plot) facing the line of approach from the SP. Record the color of the tag on the sample location page.

## 0.5 COUNTY EDIT PROCEDURES

The field is the most critical place to edit data for errors. Correcting the data in the field is more precise and accurate than doing so after being submitted to the office. For this reason, a careful field edit is a vital part of data collection.

Count all county materials and complete the Office Summary Sheet. Ensure that all materials are accounted for before starting the county. If anything is missing when you receive the county materials (i.e., old maps, any photos/imagery, plots sheets, etc.) let your field coordinator know.

Make sure all items are filled in on the Sample Location record. Check for starting point notes, azimuth and slope distance to the sample location, and that the SP description and Sketch to Sample Location match. Check completeness of the plot layout diagram, Location Sketch Map, and Sketch to Sample Location. Make sure all plots have a North arrow and the Ownership is recorded. Check the witness tree information for completeness.

Check the photographs/imagery making sure that all the SP's are marked, the photographs/imagery are drawn-up (if applicable), and all required information is recorded on the back of the photographs/imagery. Check math on course to plot azimuth, reference azimuth and angle of intersection (if applicable).

Count all county materials and complete the Office Summary Sheet when finished. Ensure that all materials are accounted for before they are sent to the state coordinator or field supervisor for editing

## 1.0 PLOT LEVEL DATA

All variables listed in Section 1.0 are collected on plots with at least one accessible forest land condition (PLOT STATUS = 1) and all NONFOREST/NONSAMPLED plots (PLOT STATUS = 2 or PLOT STATUS = 3). In general, plot level data apply to the entire plot and they are recorded from the center of subplot 1. A plot is considered nonforest if no part of it is currently located in forest land (CONDITION CLASS STATUS = 1). A plot is nonsampled if the entire plot is not sampled for one of the reasons listed in PLOT NONSAMPLED REASON.

If a forest plot has been converted to nonforest or becomes a nonsampled plot, the previous data are reconciled and an attempt is made to visit the plot during the next inventory. If a nonforest plot becomes forest or access is gained to a previously nonsampled plot, a new forest ground plot is installed. All nonforest and nonsampled plots are visited if there is any reasonable chance that they might include some forest land condition class.

Trees on previously forest land plots will be reconciled during data processing. There is a distinction between plots that have been clearcut, and plots that have been converted to another land use (landcleared). A clearcut plot is considered to be forest land until it is actively converted to another land use. Additional information concerning land use classifications is contained in Section 2.3.

### 1.1 STATE

Record the unique FIPS (Federal Information Processing Standard) code identifying the State where the plot center is located.

When collected: All plots  
 Field width: 2 digits  
 Tolerance: No errors  
 MQO: At least 99% of the time  
 Values: See Appendix 1

### 1.2 COUNTY

Record the unique FIPS (Federal Information Processing Standard) code identifying the county, parish, or borough (or unit in AK) where the plot center is located.

When collected: All plots  
 Field width: 3 digits  
 Tolerance: No errors  
 MQO: At least 99% of the time  
 Values: See Appendix 1

### 1.3 PLOT NUMBER

Record the identification number, unique within a county, parish, or borough (survey unit in AK), for each plot. If SAMPLE KIND = 3, the plot number will be assigned by the National Information Management System (NIMS).

When collected: SAMPLE KIND = 1 or SAMPLE KIND = 2  
 Field width: 5 digits  
 Tolerance: No errors  
 MQO: At least 99% of the time  
 Values: 00001 to 99999

Plot numbers in the South adhere to the following numbering system:

00001 – 00999	Standard field plots
09000 – 09999	Temporary or supplemental plots
RXXXX	Certification plots

1.4 PLOT STATUS

Record the code that describes the sampling status of the plot. In cases where a plot is inaccessible, but obviously contains no forest land, record PLOT STATUS = 2. In cases where a plot is access-denied or hazardous land use and has the possibility of forest, record PLOT STATUS = 3.

When collected: All plots

Field width: 1 digit

Tolerance: No errors

MQO: At least 99% of the time

Values:

- 1 Sampled – at least one accessible forest land condition present on plot
- 2 Sampled – no accessible forest land condition present on plot
- 3 Nonsampled

1.5 PLOT NONSAMPLED REASON

For entire plots that cannot be sampled, record one of the following reasons.

When collected: When PLOT STATUS = 3

Field width: 2 digits

Tolerance: No errors

MQO: At least 99% of the time

Values:

- 01 Outside U.S. boundary – Entire plot is outside of the U.S. border.
- 02 Denied access – Access to the entire plot is denied by the legal owner, or by the owner of the only reasonable route to the plot. Because a denied-access plot can become accessible in the future, it remains in the sample and is re-examined at the next occasion to determine if access is available.
- 03 Hazardous – Entire plot cannot be accessed because of a hazard or danger, for example cliffs, quarries, strip mines, illegal substance plantations, high water, etc. Although most hazards will not change over time, a hazardous plot remains in the sample and is re-examined at the next occasion to determine if the hazard is still present.
- 05 Lost data – Plot data file was discovered to be corrupt after a panel was completed and submitted for processing. This code is applied at the time of processing after notification to the units. This code is for office use only.
- 06 Lost plot – Entire plot cannot be found. Whenever this code is assigned, a replacement plot is required. The plot that is lost is assigned SAMPLE KIND = 2 and NONSAMPLED REASON = 6. The replacement plot is assigned SAMPLE KIND = 3.
- 07 Wrong location – Previous plot can be found, but its placement is beyond the tolerance limits for plot location. Whenever this code is assigned, a replacement plot is required. The plot being relocated is assigned SAMPLE KIND = 2 and NONSAMPLED REASON = 7. Its replacement plot is assigned SAMPLE KIND = 3.
- 08 Skipped visit – Entire plot skipped. Used for plots that are not completed prior to the time a panel is finished and submitted for processing. This code is for office use only.
- 09 Dropped intensified plot - Intensified plot dropped due to a change in grid density. This code used only by units engaged in intensification. This code is for office use only.
- 10 Other – Entire plot not sampled due to a reason other than one of the specific reasons already listed. A field note is required to describe the situation. **SRS Note:** This code should **only** be used when the PC falls outside the state boundary. Valid in state border counties only.
- 11 Ocean – Plot falls in ocean water below mean high tide line.

1.6 SUBPLOTS EXAMINED

Record the number of subplots examined. By default, PLOT STATUS = 1 plots have all 4 subplots examined.

When collected: When PLOT STATUS = 2 or 3

Field width: 1 digit

Tolerance: No errors

MQO: At least 90% of the time

Values:

1	Only subplot 1 center condition examined and all other subplots assumed (inferred) to be the same
4	All four subplots fully described (no assumptions/inferences)

1.7 SAMPLE KIND

Record the code that describes the kind of plot being installed.

When collected: All plots

Field width: 1 digit

Tolerance: No errors

MQO: At least 99% of the time

Values:

- 1 Initial plot establishment - the initial establishment and sampling of a national design plot (FIA Field Guide versions 1.1 and higher). SAMPLE KIND 1 is assigned under the following circumstances:
  - Initial activation of a panel or subpanel
  - Reactivation of a panel or subpanel that was previously dropped
  - Resampling of established plots that were not sampled at the previous visit
- 2 Remeasurement – remeasurement of a national design plot that was sampled at the previous inventory.
- 3 Replacement plot - a replacement plot for a previously established plot. Assign SAMPLE KIND = 3 if a plot is re-installed at a location other than the original location (i.e., plots that have been lost, moved, or otherwise replaced). Note that replacement plots require a separate plot file for the replaced plot. Replaced plots are assigned SAMPLE KIND = 2, PLOT STATUS = 3, and the appropriate NONSAMPLED REASON code. The plot number for the new (replacement) plot is assigned by NIMS.

1.8 PREVIOUS PLOT NUMBER

Record the identification number for the plot that is being replaced.

When collected: When SAMPLE KIND = 3

Field width: 5 digits

Tolerance: No errors

MQO: At least 99% of the time

Values: 00001 to 99999

1.9 FIELD GUIDE VERSION

Record the version number of the National Core Field Guide that was used to collect the data on this plot. FIELD GUIDE VERSION will be used to match collected data to the proper version of the field guide.

When collected: All plots

Field width: 2 digits (x.y)

Tolerance: No errors

MQO: At least 99% of the time

Values: 4.0

1.10 CURRENT DATE

Record the year, month, and day that the current plot visit was completed as described in 1.10.1 – 1.10.3.

1.10.1 YEAR

Record the year that the plot was completed.

When collected: All plots  
 Field width: 4 digits  
 Tolerance: No errors  
 MQO: At least 99% of the time  
 Values:  $\geq$  2003

1.10.2 MONTH

Record the month that the plot was completed.

When collected: All plots  
 Field width: 2 digits  
 Tolerance: No errors  
 MQO: At least 99% of the time  
 Values:

January	01	May	05	September	09
February	02	June	06	October	10
March	03	July	07	November	11
April	04	August	08	December	12

1.10.3 DAY

Record the day of the month that the plot was completed.

When collected: All plots  
 Field width: 2 digits  
 Tolerance: No errors  
 MQO: At least 99% of the time  
 Values: 01 to 31

1.11 DECLINATION (CORE OPTIONAL)

Record the azimuth correction used to adjust magnetic north to true north. All azimuths are assumed to be magnetic azimuths unless otherwise designated. The Portland FIA unit historically has corrected all compass readings for true north. This field is to be used only in cases where units are adjusting azimuths to correspond to true north; for units using magnetic azimuths, this field will always be set = 0 in the office. This field carries a decimal place because the USGS corrections are provided to the nearest half degree. DECLINATION is defined as:

$$\text{DECLINATION} = (\text{TRUE NORTH} - \text{MAGNETIC NORTH})$$

When collected: CORE OPTIONAL: All plots  
 Field width: 5 digits including sign (+xxx.y)  
 Tolerance: No errors  
 MQO: At least 99% of the time  
 Values: +/- 50

1.12 HORIZONTAL DISTANCE TO IMPROVED ROAD

Record the straight-line distance from plot center (subplot 1) to the nearest improved road. An improved road is a road of any width that is maintained as evidenced by pavement, gravel, grading, ditching, and/or other improvements.

When collected: All plots with at least one accessible forest land condition class (PLOT STATUS = 1)

Field width: 1 digit

Tolerance: No errors

MQO: At least 90% of the time

Values:

- 1 100 ft or less
- 2 101 to 300 ft
- 3 301 to 500 ft
- 4 501 to 1000 ft
- 5 1001 ft to 1/2 mile
- 6 1/2 to 1 mile
- 7 1 to 3 miles
- 8 3 to 5 miles
- 9 Greater than 5 miles

1.13 WATER ON PLOT

Record the water source that has the greatest impact on the area within the accessible forest land portion of any of the four subplots. The coding hierarchy is listed in order from large permanent water to temporary water. This variable can be used for recreation, wildlife, hydrology, and timber availability studies. This water is limited to water that is too small to qualify as its own condition (CONDITION CLASS STATUS = 3 or 4).

When collected: All plots with at least one accessible forest land condition class (PLOT STATUS = 1)

Field width: 1 digit

Tolerance: No errors

MQO: At least 90% of the time

Values:

- 0 None – no water sources within the accessible forest land CONDITION CLASS
- 1 Permanent streams or ponds too small to qualify as noncensus water
- 2 Permanent water in the form of deep swamps, bogs, marshes without standing trees present and less than 1.0 ac in size, or with standing trees
- 3 Ditch/canal – human-made channels used as a means of moving water, such as irrigation or drainage which are too small to qualify as noncensus water
- 4 Temporary streams
- 5 Flood zones – evidence of flooding when bodies of water exceed their natural banks
- 9 Other temporary water – specify in plot notes

1.14 QA STATUS

Record the code to indicate the type of plot data collected, using the following codes:

When collected: All plots

Field width: 1 digit

Tolerance: No errors

MQO: At least 99% of the time

Values:

- 1 Standard production plot
- 2 Cold check (QA crew reviews collected data while checking plot; may be done with or without field crew present)
- 3 Reference plot (off grid – SRS QA certification plot answer key)
- 4 Training/practice plot (off grid – SRS field crew certification plot)
- 5 Botched plot file (disregard during data processing)
- 6 Blind check (Designated field crew (standard or QA) remeasures a field plot for a second time without reviewing the data)
- 7 Hot check (production plot)

1.15 CREW NUMBER

Record up to 5 crew numbers as assigned to the field crew; always record the crew leader first. The first 2 digits are for the responsible unit's station number (NRS – 24xxxx, SRS – 33xxxx, RMRS – 22xxxx, and PNW – 26xxxx).

When collected: All plots

Field Width: 6 digits

Tolerance: No errors

MQO: At least 99% of the time

Values:

NRS	240001 – 249999
SRS	330001 – 339999
RMRS	220001 – 229999
PNW	260001 – 269999

1.16 GPS Coordinates

Use a global positioning system (GPS) unit to determine the plot coordinates and elevation of all field-visited plot locations.

1.16.1 GPS Unit Settings, Datum, and COORDINATE SYSTEM

Consult the GPS unit operating manual or other regional instructions to ensure that the GPS unit internal settings, including Datum and Coordinate system, are correctly configured.

Each FIA unit will determine the Datum to be used in that region. Most will use the NAD 27 Datum (also known as NAS-C or NA 27 CONUS/CLK66), but coordinates collected using any appropriate datum can be converted back to a national standard (NAD 83) for reporting purposes.

Each FIA unit will also determine which coordinate system to use. Regions using a Geographic system will collect coordinates in Degrees, Minutes, and Seconds of Latitude and Longitude; the regions using the UTM coordinate system will collect UTM Easting, Northing, and Zone.

Southern FIA GPS units should be set to the NAD 83 Datum with WAAS enabled.

1.16.2 Collecting Readings

Collect at least 180 GPS readings at the plot center. These may be collected in a file for post-processing or may be averaged by the GPS unit. Each individual position should have an error of less than 70 feet if possible (the error of all the averaged readings is far less).

Soon after arriving at plot center, use the GPS unit to attempt to collect coordinates. If suitable positions (180 readings at error less than or equal to 70 feet) cannot be obtained, try again before leaving the plot center.

If it is still not possible to get suitable coordinates from plot center, attempt to obtain them from a location within 200 feet of plot center. Obtain the azimuth and horizontal distance from the "offset" location to plot center. If a PLGR unit is used, use the Rng-Calc function in the PLGR to compute the coordinates of the plot center. If another type of GPS unit is used, record the azimuth and horizontal distance as described in Sections 1.15.12 and 1.15.13.

Coordinates may be collected further away than 200 feet from the plot center if a laser measuring device is used to determine the horizontal distance from the "offset" location to plot center. Again, if a PLGR unit is used, use the Rng-Calc function in the PLGR to compute the coordinates of the plot center. If another type of GPS unit is used, record the azimuth and horizontal distance as described in Sections 1.16.12 and 1.16.13.

In all cases try to obtain at least 180 positions before recording the coordinates.

1.16.3 GPS UNIT

Record the kind of GPS unit used to collect coordinates. If suitable coordinates cannot be obtained, record 0.

When collected: All field visited plots

Field width: 1 digit

Tolerance: No errors

MQO: At least 99% of the time

Values:

- 0 GPS coordinates not collected
- 1 Rockwell Precision Lightweight GPS Receiver (PLGR)
- 2 Other brand capable of field-averaging (i.e. Garmin 60 or 76 series)
- 3 Other brands capable of producing files that can be post-processed
- 4 Other brands not capable of field-averaging or post-processing

1.16.4 GPS SERIAL NUMBER

Record the last six digits of the serial number on the GPS unit used.

When collected: When GPS UNIT > 0

Field width: 6 digits

Tolerance: No errors

MQO: At least 99% of the time

Values: 000001 to 999999

1.16.5 GPS DATUM

Record the acronym indicating the map datum that the GPS coordinates are collected in (i.e., the map datum selected on the GPS unit to display the coordinates).

When collected: When GPS UNIT >0

Field width: 5 characters (ccnn)

Tolerance: No errors

MQO: At least 99% of the time

Values:

NAD27	North American Datum of 1927
NAD83	North American Datum of 1983
WGS84	World Geodetic System of 1984

1.16.6 COORDINATE SYSTEM

Record a code indicating the type of coordinate system used to obtain readings.

When collected: When GPS UNIT > 0

Field width: 1 digit

Tolerance: No errors

MQO: At least 99% of the time

Values:

- 1 Geographic coordinate system
- 2 UTM coordinate system

1.16.7 Latitude

Record the latitude of the plot center to the nearest hundredth second, as determined by GPS. If the coordinates cannot be corrected and an offset point is used, record the latitude at the offset location.

NOTE: The following can be customized at the region level (e.g., decimal minutes to the nearest thousandth) as long as the final results recorded are within the specified tolerance to the nearest hundredth of a second or +/- 1.01 ft.

#### 1.16.7.1 LATITUDE DEGREES

Record the latitude degrees of the plot center as determined by GPS.

When collected: When COORDINATE SYSTEM = 1  
Field width: 3 digits (1<sup>st</sup> digit is + or -, last 2 digits are numeric)  
Tolerance: No errors  
MQO: At least 99% of the time  
Values: 0-90

#### 1.16.7.2 LATITUDE MINUTES

Record the latitude minutes of the plot center as determined by GPS.

When collected: When COORDINATE SYSTEM = 1  
Field width: 2 digits  
Tolerance: No errors  
MQO: At least 99% of the time  
Values: 1 – 59

#### 1.16.7.3 LATITUDE SECONDS

Record the latitude decimal seconds of the plot center to the nearest hundredth place as determined by GPS.

When collected: When COORDINATE SYSTEM = 1  
Field width: 4 digits  
Tolerance: +/- 140 ft  
MQO: At least 99% of the time  
Values: 0.00 - 59.99

#### 1.16.8 Longitude

Record the longitude of the plot center, to the nearest hundredth second, as determined by GPS. If the coordinates cannot be corrected and an offset point is used, record the longitude at the offset location.

NOTE: The following can be customized at the region level (e.g., decimal minutes to the nearest thousandth) as long as the final results recorded are within the specified tolerance to the nearest hundredth of a second or +/- 1.01 ft.

#### 1.16.8.1 LONGITUDE DEGREES

Record the longitude degrees of the plot center as determined by GPS.

When collected: When COORDINATE SYSTEM = 1  
Field width: 4 digits (1<sup>st</sup> digit is + or -, last 3 digits are numeric)  
Tolerance: No errors  
MQO: At least 99% of the time  
Values: 1-180

#### 1.16.8.2 LONGITUDE MINUTES

Record the longitude minutes of the plot center as determined by GPS.

When collected: When COORDINATE SYSTEM = 1  
Field width: 2 digits  
Tolerance: No errors  
MQO: At least 99% of the time  
Values: 1 – 59

### 1.16.8.3 LONGITUDE SECONDS

Record the longitude decimal seconds of the plot center to the nearest hundredth place as determined by GPS.

When collected: When COORDINATE SYSTEM = 1  
Field width: 4 digits  
Tolerance: +/- 140 ft  
MQO: At least 99% of the time  
Values: 0.00 – 59.99

### 1.16.9 UTM ZONE

Record a 2-digit and 1 character field UTM ZONE as determined by GPS.

When collected: When COORDINATE SYSTEM = 2  
Field width: 3 digits: (##C)  
Tolerance: No errors  
MQO: At least 99% of the time  
Values: Number varies from 2 in Alaska to 19 on the East Coast. The letter varies from Q in Hawaii to W in Alaska.

### 1.16.10 EASTING (X) UTM

Record the Easting coordinate of the plot center as determined by GPS.

When collected: When COORDINATE SYSTEM = 2  
Field width: 7 digits  
Tolerance: +/- 140 ft  
MQO: At least 99% of the time  
Values: 0000000 - 9999999

### 1.16.11 NORTHING (Y) UTM

Record the Northing coordinate of the plot center as determined by GPS.

When collected: When COORDINATE SYSTEM = 2  
Field width: 7 digits  
Tolerance: +/- 140 ft  
MQO: At least 99% of the time  
Values: 0000000 - 9999999

### 1.16.12 Correction For "Offset" Location

As described in Section 1.14.2, coordinates may be collected at a location other than the plot center (an "offset" location). If a PLGR unit is used, all offset coordinates will be "corrected" back using the Rng/Calc function. If a GPS unit other than a PLGR is used, then record items 1.16.13 and 1.16.14.

### 1.16.13 AZIMUTH TO PLOT CENTER

Record the azimuth from the location where coordinates were collected to actual plot center. If coordinates are collected at plot center, record 000.

When collected: When GPS UNIT = 2, 3 or 4  
Field width: 3 digits  
Tolerance: +/- 3 degrees  
MQO: At least 99% of the time  
Values: 000 when coordinates **are** collected at plot center  
001 to 360 when coordinates **are not** collected at plot center

#### 1.16.14 DISTANCE TO PLOT CENTER

Record the horizontal distance in feet from the location where coordinates were collected to the actual plot center. If coordinates are collected at plot center, record 000. As described in Section 1.16.2, if a laser range finder is used to determine DISTANCE TO PLOT CENTER, offset locations may be up to 999 feet from the plot center. If a range finder is not used, the offset location must be within 200 feet.

When collected: When GPS UNIT = 2, 3 or 4

Field width: 3 digits

Tolerance: +/- 6 ft

MQO: At least 99% of the time

Values: 000 when coordinates **are** collected at plot center

001 to 200 when a Laser range finder **is not** used to determine distance

001 to 999 when a Laser range finder **is** used to determine distance

#### 1.16.15 GPS ELEVATION

Record the elevation above mean sea level of the plot center, in feet, as determined by GPS. If the coordinates cannot be corrected and an offset point is used, record the elevation at the offset point. If the plot coordinates are calculated from a waypoint and plot center was not occupied, record 99999 because elevation cannot be calculated.

When collected: When GPS UNIT = 1, 2 or 4

Field width: 6 digits (1<sup>st</sup> digit is + or -, last 5 digits are numeric)

Tolerance:

MQO: At least 99% of the time

Values: -00100 to +20000

#### 1.16.16 GPS ERROR

Record the error as shown on the GPS unit to the nearest foot. As described in Section 1.16.2, make every effort to collect readings only when the error less than or equal to 70 feet. However, if after trying several different times during the day, at several different locations, this is not possible, record readings with an error of up to 999 feet.

When collected: When GPS UNIT = 1 or 2

Field width: 3 digits

Tolerance: No errors

MQO: At least 99% of the time

Values: 000 - 999

071 to 999 if an error of less than 70 cannot be obtained

#### 1.16.17 NUMBER OF READINGS

Record a 3-digit code indicating how many readings were averaged by the GPS unit to calculate the plot coordinates. Collect at least 180 readings if possible.

When collected: When GPS UNIT = 1 or 2

Field width: 3 digits

Tolerance: No errors

MQO: At least 99% of the time

Values: 001 to 999

#### 1.16.18 GPS FILENAME (CORE OPTIONAL)

Record the filename containing the GPS positions collected on the plot.

When collected: When GPS UNIT = 3

Field width: 15 characters

Tolerance: No errors

MQO: At least 99% of the time

Values: English words, phrases and numbers

**1.17 MACROPLOT BREAKPOINT DIAMETER (CORE OPTIONAL)**  
 When the macroplot core option is being utilized, record the value selected for breakpoint diameter for that particular plot. If macroplots are not being installed, this item will be left blank. A macroplot breakpoint diameter is the diameter (either DBH or DRC) above which trees are measured on the plot extending from 0.01 to 58.9 feet horizontal distance from the center of each subplot. Examples of different breakpoint diameters used by western FIA units are 24 inches or 30 inches (Pacific Northwest), or 21 inches (Interior West). Installation of macroplots is core optional and is used to have a larger plot size in order to more adequately sample large trees.

When collected: All plots  
 Field width: 2 digits (xx)  
 Tolerance: No errors  
 MQO: At least 99% of the time  
 Values: 21, 24, and 30

**1.18 PLOT NOTES**  
 Use these fields to record notes pertaining to the entire plot. If the notes apply only to a specific subplot or other specific aspect of the plot, then make that clear in the notes.

When collected: All plots  
 Field width: Unlimited alphanumeric character field  
 Tolerance: N/A  
 MQO: N/A  
 Values: English language words, phrases and numbers

**1.19 SRS CYCLE**  
 Record the cycle number of the current plot.

When collected: All plots  
 Field width: 2 digits  
 Tolerance: No errors  
 MQO: At least 99% of the time  
 Values: 01 to 99

**1.20 SRS SUBCYCLE**  
 Record the subcycle of the plot.

When collected: All plots  
 Field width: 1 digit  
 Tolerance: No errors  
 MQO: At least 99% of the time  
 Values: 1 to 5

**1.21 SRS PHASE**  
 Record the phase number of the plot

When collected: All plots  
 Field width: 1 digit  
 Tolerance: No errors  
 MQO: At least 99% of the time  
 Values:  
     2 Standard field plot (measured year-round)  
     3 Standard field plot with forest health variables (measured only during specified time frame)

**1.22 SRS PLOT IN CORRECT COUNTY?**

Record the code that states if the plot center is in the correct county. This item will automatically default to '1' in the data recorder. If plot center lands in a county other than the county that it is assigned to, then enter code '0'. A screen will appear where the correct county is entered. This information will be automatically forwarded to FIA office staff when the plot is transmitted.

When collected: All plots  
 Field width: 1 digit  
 Tolerance: No errors  
 MQO: At least 99% of the time  
 Values:

0	Plot center is not in the county the plot is assigned to
1	Plot center is in the county the plot is assigned to

**1.23 SRS CORRECT COUNTY**

Record the unique FIPS (Federal Information Processing Standard) code identifying the correct county, parish, or borough (or unit in AK) where the plot center is actually located.

When collected: All plots where PLOT IN CORRECT COUNTY = 0  
 Field width: 3 digits  
 Tolerance: No errors  
 MQO: At least 99% of the time  
 Values: See Appendix 1

**1.24 SRS PAST DATE**

Record the year, month, and day that the current plot was last inventoried in the same format as CURRENT DATE:

**1.24.1 SRS PAST YEAR**

Record the year that the plot was last inventoried.

When collected: SAMPLE KIND = 2,8 and 9  
 Field width: 4 digits  
 Tolerance: No errors  
 MQO: At least 99% of the time  
 Values: ≤ 2003

**1.24.2 SRS PAST MONTH**

Record the month that the plot was last inventoried.

When collected: SAMPLE KIND = 2,8 and 9  
 Field width: 2 digits  
 Tolerance: No errors  
 MQO: At least 99% of the time  
 Values:

January	01	May	05	September	09
February	02	June	06	October	10
March	03	July	07	November	11
April	04	August	08	December	12

**1.24.3 SRS PAST DAY**

Record the day of the month that the plot was last inventoried.

When collected: SAMPLE KIND = 2,8 and 9  
 Field width: 2 digits  
 Tolerance: No errors  
 MQO: At least 99% of the time  
 Values: 01 to 31

1.25 SRS NUMBER OF ACCESSIBLE FOREST LAND CONDITIONS

Record the number of accessible forest land conditions that are sampled on the plot.

When collected: PLOT STATUS = 1

Field width: 1 digit

Tolerance: No errors

MQO: At least 99% of the time

Values: 1-9

1.26 SRS PLOT ACCESSIBILITY

Record the code to describe the accessibility of the plot. The code that is most significant for the plot should be selected. For example, if the plot is located in permanent water and is accessed by boat, the most appropriate code would be "4 – Plot is accessed by boat".

When collected: All plots

Field width: 1 digit

Tolerance: no errors

MQO: At least 90% of the time

Values:

- 0 Typical plot for the area
- 1 Plot suitable for a one-person crew
- 2 Plot affected by seasonal high water
- 3 Plot affected by permanent water (beaver pond, tidal swamp, etc.)
- 4 Plot is accessed by boat
- 5 Plot access requires long hike
- 6 Plot has significant permanent thick brush (rhododendron, bay, pocosin, etc.)
- 7 Plot has significant temporary thick brush (e.g., clearcut)
- 8 Plot has significant deadfall/windthrow
- 9 Other (describe in plot notes)

1.27 SRS GPS STATUS

Record the code to describe the status of the GPS coordinates collected.

When collected: All plots

Field width: 1 digit

Tolerance: no errors

MQO: At least 90% of the time

Values:

- 1 GPS coordinates collected normally (includes instances when coordinates cannot be collected)
- 8 Previously field-collected coordinates displayed in NaTally verified
- 9 Plot remotely sampled – no field visit



## 2.0 CONDITION CLASS

The Forest Inventory and Analysis (FIA) plot is cluster of four subplots in a fixed pattern. Subplots are never reconfigured or moved in order to confine them to a single condition class; a plot may straddle more than one condition class. Every plot samples at least one condition class: the condition class present at plot center (the center of subplot 1).

### 2.1 DETERMINATION OF CONDITION CLASS

#### 2.1.1 Step 1: Delineate the plot area by CONDITION CLASS STATUS

The first attribute considered when defining a condition class is CONDITION CLASS STATUS. The area sampled by a plot is assigned to condition classes based upon the following differences in CONDITION CLASS STATUS:

1. Accessible forest land
2. Nonforest land
3. Noncensus water
4. Census water
5. Nonsampled

Accessible forest land defines the population of interest for FIA purposes. This is the area where most of the data collection is conducted. Only delineate between condition 2 – 5 above on subplots that have at least one accessible forest land condition (SUPLOT STATUS = 1). Do not delineate between nonforest condition 2 – 5 above on completely nonforest subplots (SUBPLOT STATUS = 2 or 3)

At time of re-inventory, one additional attribute, PRESENT NONFOREST LAND USE, is used to define new condition classes if the sampled area on a plot has changed from accessible forest land to nonforest land (NOTE: see Section 2.5.24). This allows tracking of land use changes without requiring mapping of all nonforest land condition classes on all plots.

#### 2.1.2 Step 2: Further subdivide Accessible Forest Land by 6 delineation variables

Any condition class sampled as accessible forest land may be further subdivided, in order of listed priority, into smaller condition classes if distinct, contrasting condition classes are present because of variation in any of the following attributes within the sampled area:

1. RESERVED STATUS
2. OWNER GROUP
3. FOREST TYPE
4. STAND SIZE CLASS
5. REGENERATION STATUS
6. TREE DENSITY

No other attribute shall be the basis for recognizing contrasting accessible forest land condition classes. For each condition class recognized, several “ancillary attributes” that help describe the condition will be collected, but will not be used for delineation purposes (see Sections 2.5.7 to 2.5.23).

## 2.2 CONDITION CLASS STATUS DEFINITIONS

### 1. Accessible Forest Land

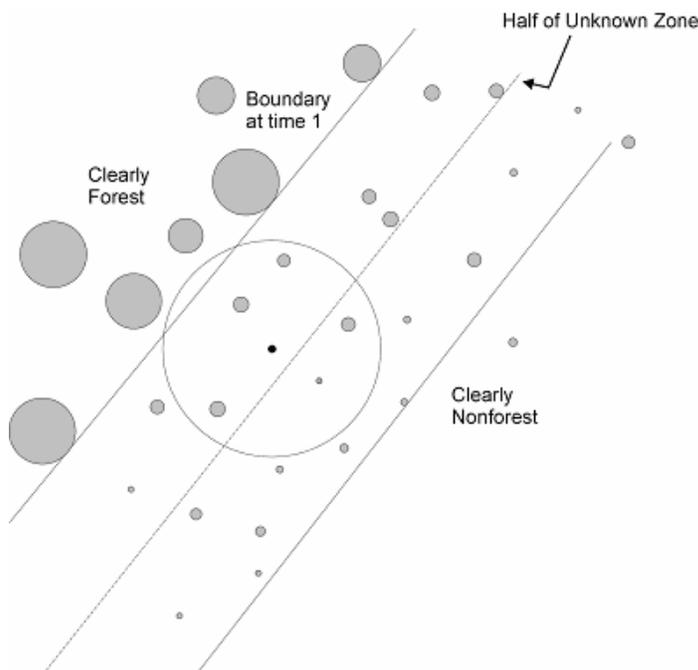
Land that is within the population of interest, is accessible, is on a subplot that can be occupied at subplot center, can safely be visited, and meets at least one of the two following criteria:

- (a) the condition is at least 10-percent stocked by trees (Appendix 3) of any size or has been at least 10-percent stocked in the past. Additionally, the condition is not subject to nonforest use(s) that prevent normal tree regeneration and succession such as regular mowing, intensive grazing, or recreation activities or managed grazing where direct human intervention is actively suppressing regeneration; or

- (b) in several woodland species (Appendix 3) where stocking cannot be determined, and the condition has at least 5 percent crown cover by trees of any size, or has had at least 5 percent cover in the past. Additionally, the condition is not subject to nonforest use that prevents normal regeneration and succession such as regular mowing, chaining, or recreation activities.

To qualify as forest land, the prospective condition must be at least 1.0 acre in size and 120.0 feet wide measured stem-to-stem from the outer-most edge. Forested strips must be 120.0 feet wide for a continuous length of at least 363.0 feet in order to meet the acre threshold. Forested strips that do not meet these requirements are classified as part of the adjacent nonforest land. There are two specific exceptions to this rule that will be discussed later in the chapter (see 12).

Transition zones and forest/nonforest encroachment – When an accessible forest land condition encroaches into a nonforest land condition, the border between forest and nonforest is often a gradual change in tree cover or stocking with no clear and abrupt boundary. In addition, it may be difficult to determine exactly where the forested area meets the minimum stocking criteria and where it does not. For these cases, determine where the land clearly meets the 10 percent minimum forest land stocking, and where it clearly is less than required stocking; divide the zone between these points in half, and determine the side of the zone on which the subplot center is located. Classify the condition class of the subplot based on this line (Figure 2).



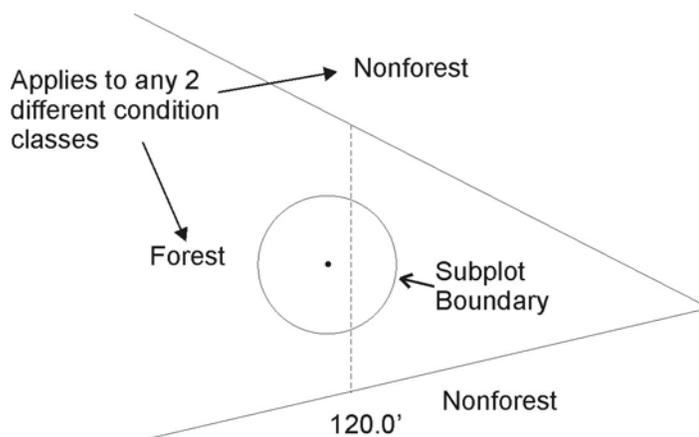
**Figure 2. Example of classifying the condition class of the subplot in a transition zone with forest/nonforest encroachment.**

For example, at measurement time 1, a clear and distinct boundary existed between the forest and nonforest land condition classes. At time 2, however, there now exists a zone of regeneration or small-diameter trees between the previous forest condition and where the nonforest clearly remains. If the zone of encroachment is clearly stocked where it meets the nonforest, classify the entire zone as forest. If the zone is clearly nonforest up to the original stand, call it all nonforest. If the encroachment or transition zone is not clearly stocked where it meets the nonforest, determine where it is clearly stocked (forest) and where it is clearly not stocked (nonforest); divide this zone in half, and classify the entire subplot based on which side of the line the subplot center falls.

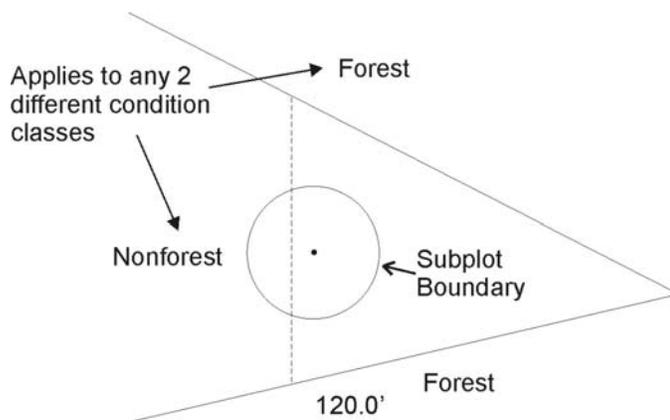
Treated strips – Occasionally, crews will come across plantations of trees, in which rows of trees alternate with strips of vegetation that have been bulldozed, mowed, tilled, treated with herbicide,

or crushed. Because these strip treatments are conducted to optimize growth or to release the stand, the areas are considered forest land, and the treatment is considered a timber stand improvement operation. Do not confuse these practices with similar treatments on nonforest lands such as yards or rights-of-way. Contact with the landowner may help determine the intent of a treatment.

Indistinct boundary due to the condition minimum-width definition – Do not subdivide subplots where a condition class may change due only to the forest vs. nonforest minimum width (120.0 feet) definition. Although the point where the definition changes from forest to nonforest creates an invisible “line” between conditions, **this definitional boundary is not distinct and obvious**. See Figures 3 and 4. Where the point of the definition change occurs on the subplot, determine only if the subplot center is on the forest or nonforest side of that approximate boundary, and classify the entire subplot based on the condition of the subplot center. If the boundary crosses through the center of the subplot, classify the subplot as the condition it most resembles. If the boundary occurs between subplots, classify each subplot based on its relation to the definitional boundary.



**Figure 3. Forest condition narrows within a nonforest land condition. Examine the location of the subplot center in reference to the approximate line where the forest narrows to 120.0 ft wide. In this example, the entire subplot is classified as forest.**



**Figure 4. Nonforest land condition narrows within a forest condition. Examine the location of the subplot center in reference to the approximate line where the nonforest narrows to 120.0 ft wide. In this example, the entire subplot is classified as forest.**

2. **Nonforest Land**  
 Nonforest land is any land within the sample that does not meet the definition of accessible forest land or any of the CONDITION CLASS STATUS values defined in number 3 and 4 in Section 2.2. To qualify, the area must be at least 1.0 acre in size and 120.0 feet wide; five exceptions are discussed at the beginning of Section 2.4. Do not consider evidence of "possible" or future development or conversion. A nonforest land condition will remain in the sample and will be examined at the next plot visit to see if it has become forest land.
  
3. **Noncensus Water**  
 Lakes, reservoirs, ponds, and similar bodies of water 1.0 acre to 4.5 acres in size. Rivers, streams, canals, etc., 30.0 feet to 200 feet wide.
  
4. **Census Water**  
 Lakes, reservoirs, ponds, and similar bodies of water 4.5 acres in size and larger; and rivers, streams, canals, etc., more than 200 feet wide (1990 U.S. Census definition).
  
5. **Nonsampled**  
 See section 2.4.3 CONDITION NONSAMPLED REASON for descriptions of land that qualifies as nonsampled.

### 2.3 CONDITION CLASS ATTRIBUTES

A CONDITION CLASS NUMBER and a classification for CONDITION CLASS STATUS are required for every condition class sampled on a plot. For each condition class classified as accessible forest land, a classification is required for each of the following attributes:

- |   |   |  |
|---|---|--|
| <ul style="list-style-type: none"> <li>2.5.1 RESERVED STATUS</li> <li>2.5.2 OWNER GROUP</li> <li>2.5.3 FOREST TYPE</li> <li>2.5.4 STAND SIZE CLASS</li> <li>2.5.5 REGENERATION STATUS</li> <li>2.5.6 TREE DENSITY</li> </ul>  | } | Attributes where a change causes a separate condition class  |
| <ul style="list-style-type: none"> <li>2.5.7 OWNER CLASS</li> <li>2.5.8 PRIVATE OWNER INDUSTRIAL STATUS</li> <li>2.5.9 ARTIFICIAL REGENERATION SPECIES</li> <li>2.5.10 STAND AGE</li> <li>2.5.11 DISTURBANCE (up to 3 coded)</li> <li>2.5.12 DISTURBANCE YEAR (1 per disturbance)</li> <li>2.5.17 TREATMENT (up to 3 coded)</li> <li>2.5.18 TREATMENT YEAR (1 per treatment)</li> <li>2.5.23 PHYSIOGRAPHIC CLASS</li> </ul> | } | Ancillary - changes do not delineate a new condition class   |
| 2.5.24 PRESENT NONFOREST LAND USE (for area converted from accessible forest land condition class to nonforest land since last inventory).  |   |  |
| <ul style="list-style-type: none"> <li>2.5.25 SRS PRESENT LAND USE</li> <li>2.5.26 SRS TRACT TOTAL ACRES</li> <li>2.5.27 SRS TRACT PERCENT FOREST</li> <li>2.5.28 SRS STAND STRUCTURE</li> <li>2.5.29 SRS OPERABILITY</li> <li>2.5.30 SRS CONDITION SITE CLASS</li> <li>2.5.31 SRS FIRE</li> <li>2.5.32 SRS GRAZING</li> <li>2.5.33 SRS CUTTING TYPE 1, 2, 3</li> </ul>   | } | <div style="border: 1px solid black; padding: 2px 10px; display: inline-block;">SRS Regional Items</div> |

When classifying CONDITION CLASS STATUS, OWNER GROUP, RESERVED STATUS, and PRESENT NONFOREST LAND USE, base the classification on what is present within the area

defined by the fixed-radius plot (macroplot, subplot, or microplot). When classifying all other condition class variables, base the classification on the macroplot.

## 2.4 DELINEATING CONDITION CLASSES DIFFERING IN CONDITION CLASS STATUS:

The first step in delineating condition classes is to recognize differences in CONDITION CLASS STATUS. The most common difference is adjacent accessible forest land and nonforest land. Adjacent accessible forest land and nonforest land condition classes are recognized only if each of the two prospective condition classes is at least 1.0 acre in size, and each is at least 120.0 feet in width. These size and width minimums apply to both accessible forest land and nonforest land.

Within an accessible forest land condition class, unimproved roads, rock outcrops, and natural nonforest openings less than 1.0 acre in size and less than 120.0 feet in width are considered forest land and are not delineated and classified as a separate nonforest land condition class.

Within a nonforest land condition class, forested areas or linear strips of trees less than 1.0 acre in size and less than 120.0 feet in width are considered part of the nonforest land condition class.

**Five exceptions** to these size and width requirements apply:

1. Developed nonforest land condition: human-caused nonforest land condition classes such as homes or cabins that are less than 1.0 acre in size and 120.0 feet in width and are surrounded by forest land. There are three kinds of developed nonforest land conditions that do not have to meet area or width requirements (Figures 5, 6).
  - (a) Improved roads: paved roads, gravel roads, or improved dirt roads regularly maintained for long-term continuing use. Unimproved traces and roads created for skidding logs are not considered improved roads.
  - (b) Maintained rights-of-way: corridors created for railroads, power lines, gas lines, and canals that are periodically treated to limit the establishment and growth of trees and shrubs.
  - (c) Developments: structures and the maintained area next to a structure, all less than 1.0 acre in size and surrounded by forest land. Examples of developments are houses or trailers on very small lots, communication installations in a small cleared area within forest land, and barns and sheds.

Special situation: When a forested area is divided either by one of the situations listed above or by noncensus water, the remnant strip of trees should still be considered forest if it meets the minimum criteria. The strip must be at least 120 feet in length and at least 30 feet wide throughout the entire strip and it must be within 120 feet of the defined forest condition (Figure 6). If the separating nonforest strip is **not** in the '30' series land use or land use 92 (noncensus water) and the separation is between 30 and 119 feet in width, the alternating strip rule applies (see exception 2b). If the separating nonforest condition is greater than 119 feet, the strip of trees is included as part of the surrounding nonforest condition. If the separation is less than 30 feet, the nonforest strip is included with the surrounding forest condition.

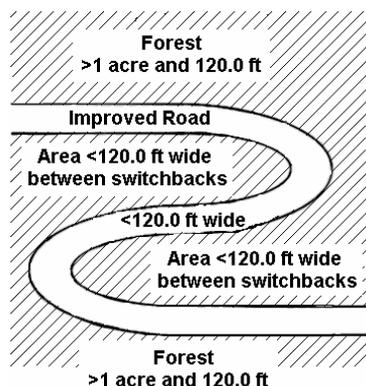


Figure 5. Example of a switchback road.

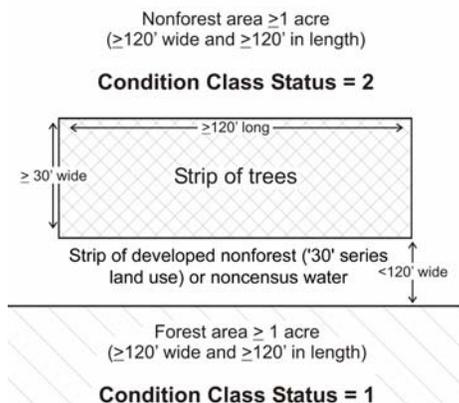
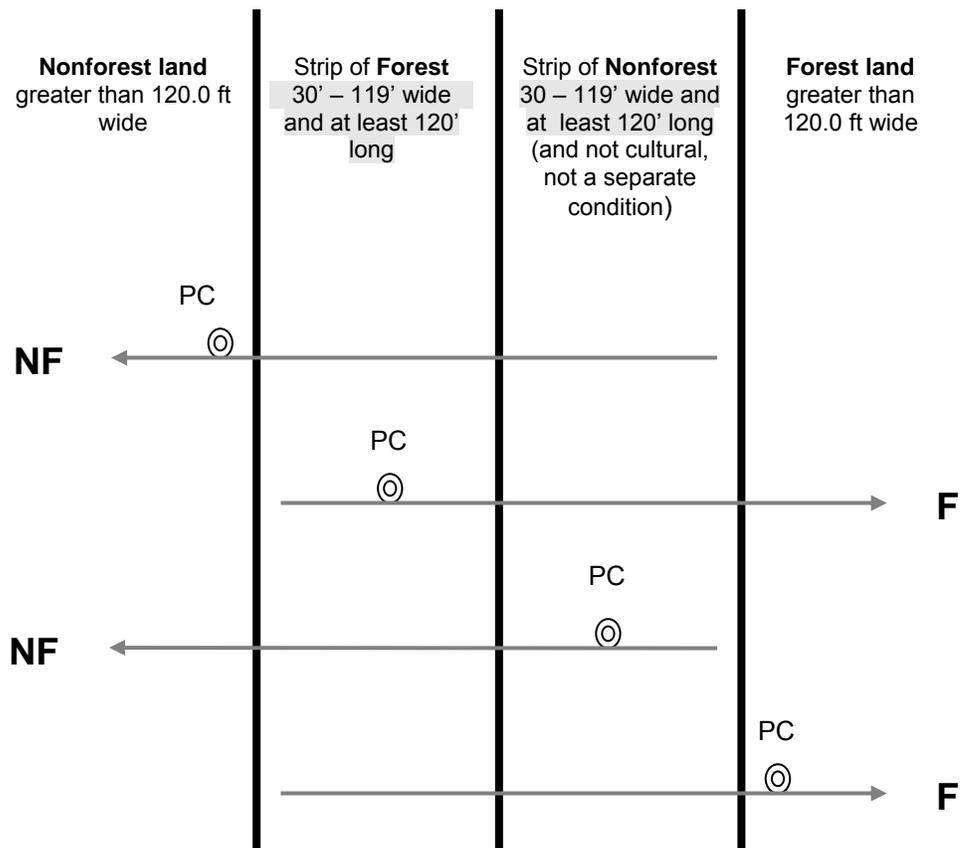


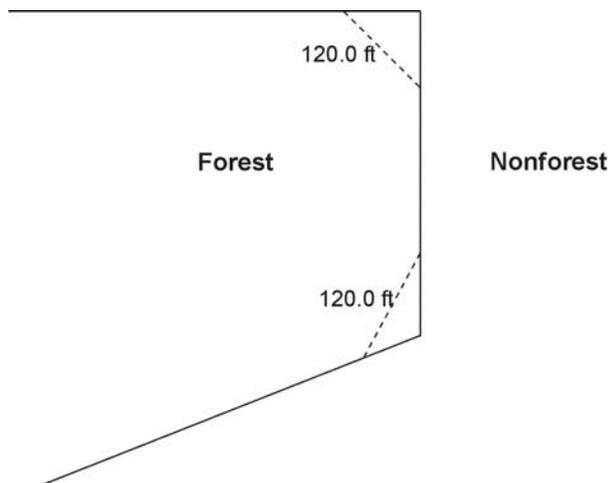
Figure 6. Example of forest condition crossing a nonforest strip.

2. Distinct, alternating strips of forest and nonforest land: this situation occurs when a plot or subplot samples a condition class that is less than 1.0 acre in size and less than 120.0 feet in width. The condition class is one of a series of parallel strips of forest and nonforest land in which none of the strips meet the minimum width requirement. This exception applies only to nonforest land conditions that are not listed under #1, e.g., improved roads, maintained rights-of-way, and developments.
  - a. For many small intermingled strips, determine the total area that the alternating strips occupy, and classify according to the CONDITION CLASS STATUS (forest land or nonforest land) that occupies the greater area. If the area of alternating strips is so large or indistinct as to make a total area determination impractical, then classify the sample as forest land.
  - b. For two alternating strips of forest and nonforest between two qualifying areas of nonforest land and forest land, see Figure 7. Figure 7 delineates the boundary between the forest and nonforest land condition classes for four different examples. The plot center defines the plot condition for all strips covered by the arrow. Any subplot that falls in the alternating strips uses the rule. Any subplot that falls in assigned nonforest / forest is assigned that type. Again, this exception applies only to nonforest land conditions that are not listed under number 1, e.g., improved roads, maintained rights-of-way, and developments.



**Figure 7. Example of alternating strips of forested and nonforested conditions. PC is the plot center (center of subplot 1).**

- The 120.0-foot minimum width for delineation does not apply when a corner angle is 90 degrees or greater (Figure 8).



**Figure 8. Illustration of the 90 degree corner rule. The dotted lines do not create nonforest land conditions.**

- Linear water features: natural water features that are linear in shape such as streams and rivers. A linear water feature must meet the definition for Census or noncensus water to be nonforest area. Therefore, a linear water feature must be at least 30.0 feet wide and cover at least 1.0 acre. The width of a linear water feature is measured across its channel between points on either side up to which water prevents the establishment and survival of trees. To determine whether a linear water feature qualifies as nonforest, rely on all available information on hand such as aerial photos, topographic maps, past survey land calls, and ocular estimates at the current survey visit. Linear water features that do not meet the definition for Census or noncensus water should be classified as forest land only if bounded by forest land on both shores. Crews are NOT expected to measure the length of a linear water feature to determine if it meets the 1.0 acre requirement; use professional judgment and common sense on any linear water feature.
- Nonsampled conditions within accessible forest land are delineated, regardless of size, as a separate condition.

#### 2.4.1 CONDITION CLASS NUMBER

On a plot, assign and record a number for each condition class. The condition class at plot center (the center of subplot 1) is designated condition class 1. Other condition classes are assigned numbers sequentially at the time each condition class is delineated.

When collected: All condition classes

Field width: 1 digit

Tolerance: No errors

MQO: At least 99% of the time

Values: 1 to 9

#### 2.4.2 CONDITION CLASS STATUS

Record the code that describes the sampling status of the condition class. The instructions in Sections 2.3 and 2.4 apply when delineating condition classes that differ by CONDITION CLASS STATUS.

When collected: All condition classes

Field width: 1 digit

Tolerance: No errors

MQO: At least 99% of the time

Values:

- 1 Accessible forest land
- 2 Nonforest land
- 3 Noncensus water
- 4 Census water
- 5 Nonsampled

#### 2.4.3 CONDITION NONSAMPLED REASON

For portions of plots that cannot be sampled (CONDITION CLASS STATUS = 5), record one of the following reasons.

When collected: When CONDITION CLASS STATUS = 5

Field width: 2 digits

Tolerance: No errors

MQO: At least 99% of the time

Values:

- 01 Outside U.S. boundary – Assign this code to condition classes beyond the U.S. border.
- 02 Denied access area – Any area within the sampled area of a plot to which access is denied by the legal owner, or to which an owner of the only reasonable route to the plot denies access. There are no minimum area or width requirements for a condition class delineated by denied access. Because a denied-access condition can become accessible in the future, it remains in the sample and is re-examined at the next occasion to determine if access is available. In some regions denied access plots may be replaced; check with the field supervisor regarding regional protocols for plot replacement.
- 03 Hazardous situation – Any area within the sampled area on plot that cannot be accessed because of a hazard or danger, for example cliffs, quarries, strip mines, illegal substance plantations, temporary high water, etc. Although the hazard is not likely to change over time, a hazardous condition remains in the sample and is re-examined at the next occasion to determine if the hazard is still present. There are no minimum size or width requirements for a condition class delineated by a hazardous condition. In some regions hazardous plots may be replaced; check with the field supervisor regarding regional protocols for plot replacement.
- 10 Other – This code is used whenever a plot or condition class is not sampled due to a reason other than one of the specific reasons listed. A field note is required to describe the situation. SRS Note: OFFICE USE ONLY – valid only when PLOT NONSAMPLED REASON = 11. This code should **only** be used when the PC falls outside the state boundary. Valid in state border counties only.
- 11 Ocean – Plot falls in ocean water below mean high tide line.

**2.5 DELINEATING CONDITION CLASSES WITHIN ACCESSIBLE FOREST LAND:**

Accessible forest land is subdivided into condition classes that are based on differences in RESERVED STATUS, OWNER GROUP, FOREST TYPE, STAND SIZE CLASS, REGENERATION STATUS, and TREE DENSITY. Section 2.1 applies when delineating contrasting forest condition classes. Specific criteria apply for each of the six attributes and are documented by attribute in 2.5.1 to 2.5.6. “Stands” are defined by plurality of stocking for all live trees that are not overtopped.

Additionally, each separate forest condition class recognized within accessible forest land must be at least 1.0 acre in size and at least 120.0 feet in width. If prospective contrasting forest land condition classes do not each meet these minimum size and width requirements, the most similar prospective conditions should be combined until these minimums are attained.

No other attribute shall be the basis for recognizing contrasting condition classes within accessible forest land. For each condition class recognized, many “ancillary attributes” that help describe the condition will be collected, but will not be used for delineation purposes (see Sections 2.5.7 to 2.5.23).

General instructions for delineating condition classes within accessible forest lands:

1. Distinct boundary within a macroplot (if applicable), subplot, or microplot – Separate condition classes ARE recognized if, within a subplot, two (or more) distinctly different condition classes are present and delineated by a distinct, abrupt boundary. The boundary is referenced; see Section 4.0.
2. Indistinct boundary within a subplot – Separate condition classes are NOT recognized if the prospective condition classes abut along an indistinct transition zone, rather than on an abrupt, obvious boundary. Only one condition is recognized, and the subplot is classified entirely as the condition it most resembles.

Example: The four subplots all sample only accessible forest land. Subplots 1, 3, and 4 sample what is clearly a stand of large-diameter trees. Subplot 2 falls in the middle of a stand-size transition zone. In the zone, the large-diameter stand phases into a sapling stand.

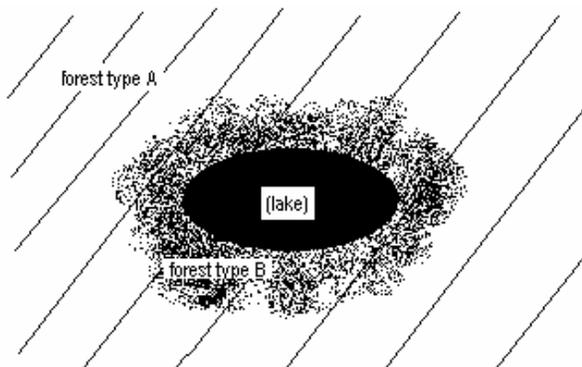
Subplot 2 must not be divided into two condition classes on the basis of stand size. Instead, it is treated entirely as part of the large-diameter condition class or is assigned entirely to a new condition class that is classified as a seedling-sapling stand. The latter occurs only if the crew thinks the entire subplot is more like a stand of seedlings-saplings than a stand of large-diameter trees; then the boundary between the large- and small-diameter stands is assumed to occur between and not on the subplots.

3. A boundary or transition zone between fixed radii plots that sample distinctly different condition classes – Separate condition classes are recognized and recorded when a valid attribute obviously differs between two fixed-radius plots, but a distinct boundary or indistinct transition zone exists outside the sampled (fixed-radius) area of the subplots. In such cases, a boundary, if present, is not referenced.

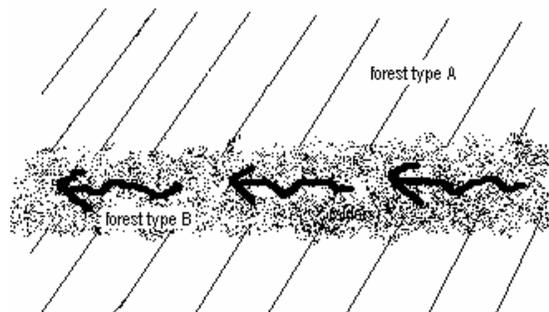
Example: The northernmost subplot (2) samples entirely accessible forest land. The other three subplots, 1, 3, and 4, fall clearly in a nonforest meadow. Between subplot 1 and 2 is a transition zone; the number of trees present goes from none to what clearly represents at least 10-percent tree stocking. Two condition classes are sampled: accessible forest land sampled on subplot 2, and nonforest land sampled on the other subplots.

4. Riparian forest area – A riparian forest area is defined as a forest area between 30.0 and 120.0 feet wide, and 1.0 acre or more in size, cumulative, and adjacent to but not necessarily present on both sides of a naturally occurring or artificially created body of water or watercourse with continuous or intermittent flow. Riparian forest areas may be associated with but not limited to streams, rivers, lakes, sloughs, seeps, springs, marsh, bogs, beaver ponds, sink holes, cypress domes and ponds, man-made ditches and canals. A riparian forest area must be associated “within forest” and contain at least one distinct and obvious change in a condition class delineation attribute from its adjacent accessible forest land condition class. Figures 9-14 provide examples of when to delineate riparian forest area as a separate condition class.

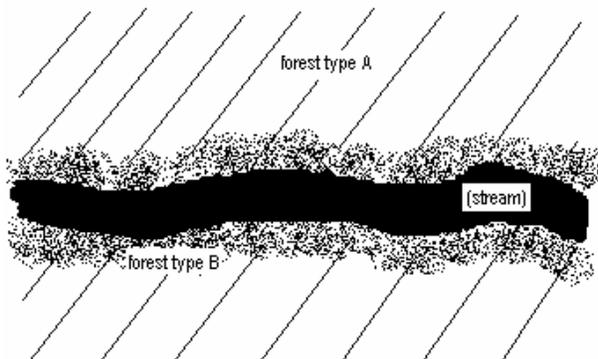
Note: When the width of forest adjacent to a stream is between 120.0 feet and 150.0 feet and the width of the riparian forest is at least 30.0 feet wide, the rules for identifying the non-riparian forest (at least 30.0 feet but less than 120.0 feet) need to be modified. The non-riparian forest can be between 30.0 feet and 120.0 feet and mapped as a separate condition as long as it meets the criteria for delineating a separate condition class, otherwise it will be an inclusion in the riparian forest condition class.



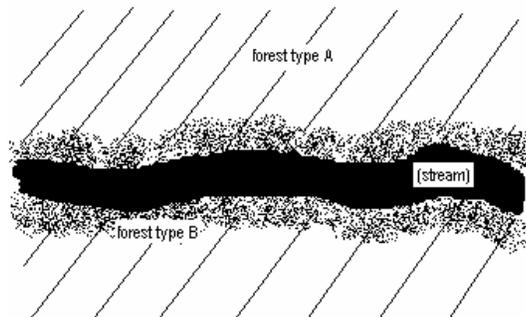
**Figure 9.** Forest type B is a separate condition class (riparian) if the band of it is between 30.0 feet and 120.0 feet wide, and is  $\geq 1.0$  acre in size.



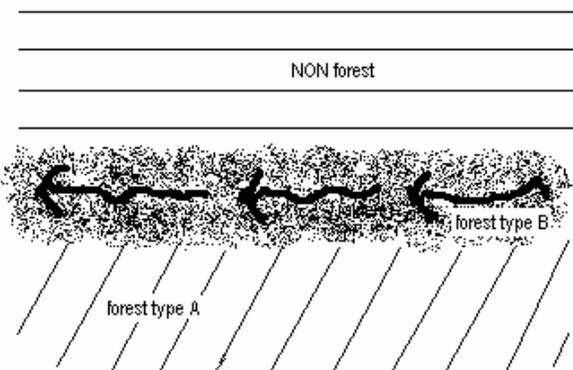
**Figure 10.** Forest type B is a separate condition class (riparian) if the band of it is between 30.0 feet and 120.0 feet wide, and is  $\geq 1.0$  acre in size.



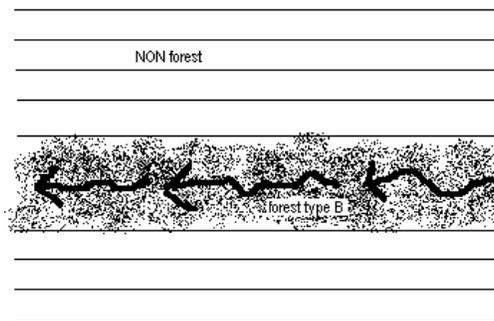
**Figure 11.** If the stream is  $< 30.0$  feet wide, forest type B is a separate condition class (riparian) if the sum of the two widths of the bands, including the stream falls between 30.0 feet and 120.0 feet wide, and is  $\geq 1.0$  acre in size.



**Figure 12.** If the stream is  $> 30.0$  feet wide, forest type B is a separate condition class (riparian) if either of the two widths of the bands falls between 30.0 feet and 120.0 feet wide and is  $\geq 1.0$  acre in size.



**Figure 13. Forest type B is a separate condition class (riparian) if the band of it is between 30.0 feet and 120.0 feet wide, and is  $\geq$  1.0 acre in size.**



**Figure 14. In a nonforested area, a band of forest type B that is < 120.0 feet wide is NOT considered a riparian area. It is not a separate condition class at all.**

### 2.5.1 RESERVED STATUS

Record the code that identifies the reserved designation for the condition. Reserved land is withdrawn by law(s) prohibiting the management of land for the production of wood products (not merely controlling or prohibiting wood-harvesting methods). Such authority is vested in a public agency or department, and supersedes rights of ownership. The prohibition against management for wood products cannot be changed through decision of the land manager (management agency) or through a change in land management personnel, but rather is permanent in nature, such as national parks, national monuments and designated wilderness areas on federal lands. State parks are not usually classified as reserved.

When collected: CORE: All accessible forest land condition classes (CONDITION CLASS STATUS = 1)

CORE OPTIONAL: All accessible forest land condition classes (CONDITION CLASS = 1) and nonforest land condition classes (CONDITION CLASS STATUS >1)

Field width: 1 digit

Tolerance: No errors

MQO: At least 99% of the time

Values:

0	Not reserved
1	Reserved

### 2.5.2 OWNER GROUP

Record the OWNER GROUP code identifying the ownership (or the managing Agency for public lands) of the land in the condition class. Conditions will be delineated based on changes in OWNER GROUP only; separate conditions due to changes in OWNER GROUP are recognized only where differences can be clearly identified on the ground when visiting the plot.

When collected: All accessible forest land condition classes (CONDITION CLASS STATUS = 1)

Field width: 2 digits

Tolerance: No errors

MQO: At least 99% of the time

Values:

10	Forest Service
20	Other Federal
30	State and Local Government
40	Private

### 2.5.3 FOREST TYPE

Record the code corresponding to the FOREST TYPE (from Appendix 2) that best describes the species with the plurality of stocking for all live trees in the condition class that are not overtopped.

If STAND SIZE CLASS is nonstocked, then FOREST TYPE is determined by the following hierarchy:

- For SAMPLE KIND = 2 plots, record the FOREST TYPE of the condition at the previous inventory.
- For all other plots:
  1. Evaluate any seedlings available to determine the FOREST TYPE.
  2. If no seedlings exist, use adjacent stands and your best professional judgment to determine FOREST TYPE.

When collected: All accessible forest land condition classes (CONDITION CLASS STATUS = 1)

Field width: 3 digits

Tolerance: No errors in group or type

MQO: At least 99% of the time in group; at least 95% of the time in type. No MQO when STAND SIZE CLASS = 0.

Values: See Appendix 2

The instructions in Sections 2.1 and 2.4 apply when delineating, within accessible forest land, contrasting conditions based on differences in FOREST TYPE.

### 2.5.4 STAND SIZE CLASS

Record the code that best describes the predominant size class of all live trees in the condition class.

When collected: All accessible forest land condition classes (CONDITION CLASS STATUS = 1)

Field width: 1 digit

Tolerance: No errors

MQO: At least 99% of the time

Values:

- 0 Nonstocked: Meeting the definition of accessible forest land, and one of the following applies:
  - (a) less than 10 percent stocked by trees of any size, and not classified as cover trees (see code 6), or
  - (b) for several woodland species where stocking standards are not available, less than 5 percent **crown cover** of trees of any size.
- 1  $\leq$  4.9 inches (seedlings / saplings): At least 10 percent stocking (or 5 percent crown cover if stocking standards are not available) in trees of any size; and at least 2/3 of the crown cover is in trees less than 5.0 inches DBH/DRC.
- 2 5.0 – 8.9 inches (softwoods) / 5.0 – 10.9 inches (hardwoods): At least 10 percent stocking (or 5 percent crown cover if stocking standards are not available) in trees of any size; and at least 1/3 of the crown cover is in trees greater than 5.0 inches DBH/DRC **and** the plurality of the crown cover is in softwoods between 5.0 – 8.9 inches diameter and/or hardwoods between 5.0 – 10.9 inches DBH, and/or woodland trees 5.0 – 8.9 inches DRC.
- 3 9.0 – 19.9 inches (softwoods) / 11.0 – 19.9 inches (hardwoods): At least 10 percent stocking (or 5 percent crown cover if stocking standards are not available) in trees of any size; and at least 1/3 of the crown cover is in trees greater than 5.0 inches DBH/DRC **and** the plurality of the crown cover is in softwoods between 9.0 – 19.9 inches diameter and/or hardwoods between 11.0 – 19.9 inches DBH, and for woodland trees 9.0 – 19.9 inches DRC.
- 4 20.0 – 39.9 inches: At least 10 percent stocking (or 5 percent crown cover if stocking standards are not available) in trees of any size; and at least 1/3 of the crown cover is in trees greater than 5.0 inches DBH/DRC **and** the plurality of the crown cover is in trees between 20.0 – 39.9 inches DBH.
- 5 40.0 + inches: At least 10 percent stocking (or 5 percent crown cover if stocking standards are not available) in trees of any size; and at least 1/3 of the crown cover is in trees greater than 5.0 inches DBH/DRC **and** the plurality of the crown cover is in trees  $\geq$  40.0 inches DBH.
- 6 Cover trees (trees not on species list, used for plots classified as nonforest): Less than 10 percent stocking by trees of any size, and greater than 5 percent **crown cover** of species that comprise cover trees.

The instructions in Sections 2.1 and 2.4 apply when delineating, on accessible forest land, contrasting conditions based on differences in STAND SIZE CLASS.

Within the sampled area on microplot, subplot, or macroplot, recognize only very obvious contrasting stands of different mean diameter with an abrupt boundary. Example: an obvious abrupt boundary exists within the sampled (fixed-radius) area of a subplot and demarcates a STAND SIZE CLASS change. Use tree stocking of all live trees that are not overtopped to differentiate between stand-size classes; for most woodland forest types (e.g., pinyon, juniper, gambel oak) where stocking standards are not readily available, use percent tree cover to represent stocking.

Use crown cover as the surrogate for stocking to determine STAND SIZE CLASS. View the plot from the top down and examine crown cover. The stand must have at least 5 percent of the crown cover in STAND SIZE CLASSES of 1, 2, 3, 4, or 5 or any combination of these STAND SIZE CLASSES; otherwise the STAND SIZE CLASS is 0. If 2/3 of the crown cover is STAND SIZE CLASS = 1, classify the condition as STAND SIZE CLASS = 1. If less than 2/3 of the crown cover is STAND SIZE CLASS = 1, classify the condition as STAND SIZE CLASS = 2, 3, 4, or 5, based on which of these STAND SIZE CLASSES has the most crown cover.

### 2.5.5 REGENERATION STATUS

Record the code that best describes the artificial regeneration that occurred in the condition.

When collected: All accessible forest land condition classes (CONDITION CLASS STATUS = 1)

Field width: 1 digit

Tolerance: No errors

MQO: At least 99% of the time

Values:

- 0 Natural – present stand shows no clear evidence of artificial regeneration.  
Includes unplanted, recently cut lands
- 1 Artificial – present stand shows clear evidence of artificial regeneration

The instructions in section 2.1 and 2.4 apply when delineating, within accessible forest land, contrasting conditions based on differences in REGENERATION STATUS.

For a forest land condition to be delineated and/or classified as artificially regenerated, the condition must show distinct evidence of planting or seeding. If it is difficult to determine whether or not a stand has been planted or seeded, then use code 0. If no distinct boundary exists within the sampled (fixed-radius) area on any subplot, then do not recognize separate conditions. In many regions of the West, trees are not planted in rows, and planted stands do not differ in physical appearance from natural conditions. In these cases, there is no need to differentiate conditions based on stand origin.

NOTE: Plot records or verbal evidence from landowner is acceptable for determining regeneration status.

### 2.5.6 TREE DENSITY

Record a code to indicate the relative tree density classification. Base the classification on the number of stems/unit area, basal area, tree cover, or stocking of all live trees in the condition that are not overtopped, compared to any previously defined condition class TREE DENSITY.

The instructions in Sections 2.1 and 2.4 apply when delineating, within accessible forest land, contrasting conditions based on differences in TREE DENSITY.

Codes 2 and higher are used ONLY when all other attributes used to delineate separate condition classes are homogenous, i.e., when a change in density is the ONLY difference within what would otherwise be treated as only one forest condition. Otherwise, code 1 for all condition classes. Codes 2 and higher are usually, but not always, used to demarcate areas that differ from an adjacent area due to forest disturbance, e.g., a partial harvest or heavy, but not total tree mortality due to a ground fire. Delineation by density should only be done when the less-dense condition is 50 percent or less as dense as the more dense condition.

Do not distinguish between low-stocked stands or stands of sparse and patchy forest.

When collected: All accessible forest land condition classes (CONDITION CLASS STATUS = 1)  
Field width: 1 digit  
Tolerance: No errors  
MQO: At least 99% of the time  
Values:

- 1 Initial density class
- 2 Density class 2 - density different than 1
- 3 Density class 3 - density different than 1 and 2

In order to qualify as a separate condition based on density, there **MUST** be a distinct, easily observed change in the density of an area's tree cover or basal area.

Examples of valid contrasting conditions defined by differences in tree density are:

- the eastern half of an otherwise homogeneous, 20-acre stand has many trees killed by a bark beetle outbreak,
- one portion of a stand is partially cut over (with 40 square feet basal area per acre) while the other portion is undisturbed (with 100 square feet basal area per acre).

NOTE: In these examples, RESERVED STATUS, OWNER GROUP, FOREST TYPE, STAND SIZE CLASS, and REGENERATION STATUS are the same.

## ANCILLARY (NON-DELINEATING) VARIABLES

### 2.5.7 OWNER CLASS

Record the OWNER CLASS code that best corresponds to the ownership (or the managing Agency for public lands) of the land in the condition class. Conditions will **NOT** be delineated based on changes in owner class. If multiple owner classes within a group occur on a single condition class, record the owner class closest to the plot center.

When collected: All accessible forest land condition classes (CONDITION CLASS STATUS = 1)  
Field width: 2 digits  
Tolerance: No errors  
MQO: At least 99% of the time  
Values:

#### Owner Classes within Forest Service Lands (Owner Group 10):

- 11 National Forest
- 12 National Grassland
- 13 Other Forest Service

#### Owner Classes within Other Federal Lands (Owner Group 20)

- 21 National Park Service
- 22 Bureau of Land Management
- 23 Fish and Wildlife Service
- 24 Departments of Defense/Energy
- 25 Other Federal

#### Owner Classes within State and Local Government lands (Owner Group 30)

- 31 State
- 32 Local (County, Municipality, etc.)
- 33 Other Non Federal Public

#### Owner Classes within Private lands (Owner Group 40)

- 41 Corporate
- 42 Non Governmental Conservation / Natural Resources Organization -- examples: Nature Conservancy, National Trust for Private Lands, Pacific Forest Trust, Boy Scouts of America, etc.
- 43 Unincorporated Partnerships / Associations / Clubs -- examples: Hunting Clubs that **own, not lease** property, recreation associations, 4H, etc.
- 44 Native American (Indian) -- within reservation boundaries
- 45 Individual

2.5.8 PRIVATE OWNER INDUSTRIAL STATUS

Record the code identifying the status of the owner with regard to being considered industrial as determined by whether or not they own and operate a primary wood processing plant. A primary wood processing plant is any commercial operation which originates the primary processing of wood on a regular and continuing basis. Examples include: pulp or paper mill, sawmill, panel board mill, post or pole mill, etc. Cabinet shops, “mom & pop” home-operated businesses, etc., should not be considered as industrial plants. If any doubt exists with the determination by the field crew about the owner’s industrial status due to name, commercial plant size, type plant, etc., choose code 0.

**NOTE:** FIA unit or State headquarters may have to maintain a list of recognized industrial owners within a State for crews to use when making these determinations.

When collected: CORE: All accessible forest land condition classes (CONDITION CLASS STATUS = 1) when the owner group is private (OWNER GROUP 40)

Field width: 1 digit

Tolerance: No errors

MQO: At least 99% of the time

Values:

- 0 Land **is not** owned by industrial owner with a wood processing plant
- 1 Land **is** owned by industrial owner with wood processing plant

2.5.9 ARTIFICIAL REGENERATION SPECIES

Record the species code of the predominant tree species for which evidence exists of artificial regeneration in the stand. This attribute is ancillary; that is, contrasting condition classes are never delineated based on variation in this attribute.

When collected: All accessible forest land condition classes (CONDITION CLASS STATUS = 1) with evidence of artificial regeneration (REGENERATION STATUS = 1)

Field width: 4 digits

Tolerance: No errors

MQO: At least 99% of the time

Values: See Appendix 3

2.5.10 STAND AGE

Record the average total age, to the nearest year, of the trees (plurality of all live trees not overtopped) in the predominant STAND SIZE CLASS of the condition, determined using local procedures. Record 000 for nonstocked stands.

An estimate of STAND AGE is required for every forest land condition class defined on a plot. Stand age is usually highly correlated with stand size and should reflect the average age of all trees that are not overtopped. Unlike the procedure for site tree age (TREE AGE AT DIAMETER), estimates of STAND AGE should estimate the time of tree establishment (e.g., not age at the point of diameter measurement). Note: For planted stands, estimate age based on the year the stand was planted (e.g., do not add in the age of the planting stock).

To estimate STAND AGE, select two or three dominant or codominant trees from the overstory. If the overstory covers a wide range of tree sizes and species, try to select the trees accordingly, but it is not necessary to core additional trees in such stands. The variance associated with mean stand age increases with stand heterogeneity, and additional cores are not likely to improve the estimate. Core each tree at the point of diameter measurement and count the rings between the outside edge and the core to the pith. Add in the number of years that passed from germination until the tree reached the point of core extraction to determine the total age of the tree. Unless more specific information is provided at training or by the unit, add 5 years to all eastern species, 5 years to western hardwoods, and 10 years to western softwoods. Assign a weight to each core by visually estimating the percentage of total overstory trees it represents. Make sure the weights from all cores add up to 1.0, compute the weighted average age, and record. For example, if three trees aged 34, 62, and 59 years represent 25 percent, 60 percent, and 15 percent of the overstory, respectively, the weighted stand age should be:

$$(34 \times 0.25) + (62 \times 0.60) + (59 \times 0.15) = 55 \text{ years.}$$

In some cases, it may be possible to avoid coring trees to determine age. If a stand has not been seriously disturbed since the previous survey, simply add the number of years since the previous inventory to the previous STAND AGE. In other situations, cores collected from site trees can be used to estimate STAND AGE.

If a condition class is nonstocked, assign a STAND AGE of 000.

If all of the trees in a condition class are of a species which, by regional standards, cannot be bored for age (e.g., mountain mahogany, tupelo) record 998. This code should be used in these cases only.

If tree cores are not counted in the field, but are collected and sent to the office for the counting of rings, record 999. Note on the core the percent of stand that type of core represents so that STAND AGE can be calculated later.

When collected: All accessible forest land condition classes (CONDITION CLASS STATUS = 1)

Field width: 3 digits

Tolerance: +/- 10%

MQO: At least 95% of the time

Values: 000 to 997, 998, 999

#### 2.5.11 DISTURBANCE 1

Record the code corresponding to the presence of the following disturbances. Disturbance can connote positive or negative effects. The area affected by any natural or human-caused disturbance must be at least 1.0 acre in size. Record up to three different disturbances per condition class from most important to least important as best as can be determined. This attribute is ancillary; that is, contrasting conditions are never delineated based on variation in this attribute.

For initial forest plot establishment (initial grid activation or newly forested plots), the disturbance must be within the last 5 years. For re-measured plots recognize only those disturbances that have occurred since the previous inventory.

The following disturbance codes require "significant threshold" damage, which implies mortality and/or damage to 25 percent of all trees in a stand or 50 percent of an individual species' count. Additionally, some disturbances affect forests but initially may not affect tree growth or health (e.g., grazing, browsing, flooding, etc.). In these cases, a disturbance should be coded when at least 25 percent of the soil surface or understory vegetation has been affected.

When collected: All accessible forest land condition classes (CONDITION CLASS STATUS = 1)

Field width: 2 digits

Tolerance: No errors

MQO: At least 99% of the time

Values: 00 – 95 (code descriptions continue on next page)

<u>Code</u>	<u>Definition</u>
00	None - no observable disturbance
10	Insect damage (to both understory vegetation and trees)
11	insect damage to understory vegetation
12	insect damage to trees, including seedlings and saplings
20	Disease damage (to both understory vegetation and trees)
21	disease damage to understory vegetation
22	disease damage to trees, including seedlings and saplings
30	Fire (from crown and ground fire, either prescribed or natural)
31	ground fire
32	crown fire
40	Animal damage (other than listed below)
41	beaver (includes flooding caused by beaver)
42	porcupine
43	deer/ungulate
44	bear (CORE OPTIONAL)
45	rabbit (CORE OPTIONAL)
46	domestic animal/livestock (includes grazing):

- 50 Weather damage (other than listed below)
  - 51 ice
  - 52 wind (includes hurricane, tornado)
  - 53 flooding (weather induced)
  - 54 drought
- 60 Vegetation (suppression, competition, vines):
- 70 Unknown/not sure/other (include in NOTES)
- 80 Human-caused damage – any significant threshold of human-caused damage not described in the DISTURBANCE codes listed or in the TREATMENT codes listed. Must include a plot-level note to describe further.
- 90 Geologic disturbances
  - 91 landslide
  - 92 avalanche track
  - 93 volcanic blast zone
  - 94 other geologic event
  - 95 earth movement/avalanches

#### 2.5.12 DISTURBANCE YEAR 1

Record the year in which DISTURBANCE 1 occurred. If the disturbance occurs continuously over a period of time, record 9999.

When collected: When DISTURBANCE 1 > 00

Field width: 4 digits

Tolerance: +/- 1 year for measurement cycles of 5 years

+/- 2 years for measurement cycles of > 5 years

MQO: At least 99% of the time

Values: Since the previous plot visit, or the past 5 years for plots visited for the first time; 9999

#### 2.5.13 DISTURBANCE 2

If a stand has experienced more than one disturbance, record the second disturbance here. See DISTURBANCE 1 for coding instructions.

#### 2.5.14 DISTURBANCE YEAR 2

Record the year in which DISTURBANCE 2 occurred. See DISTURBANCE YEAR 1 for coding instructions.

#### 2.5.15 DISTURBANCE 3

If a stand has experienced more than two disturbances, record the third disturbance here. See DISTURBANCE 1 for coding instructions.

#### 2.5.16 DISTURBANCE YEAR 3

Record the year in which DISTURBANCE 3 occurred. See DISTURBANCE YEAR 1 for coding instructions.

#### 2.5.17 TREATMENT 1

Forestry treatments are a form of disturbance. These human disturbances are recorded separately here for ease of coding and analysis. The term treatment further implies that a silvicultural application has been prescribed. This does not include occasional stumps of unknown origin or sparse removals for firewood, Christmas trees, or other miscellaneous purposes. The area affected by any treatment must be at least 1.0 acre in size. Record up to three different treatments per condition class from most important to least important as best as can be determined. This attribute is ancillary; that is, contrasting conditions are never delineated based on variation in this attribute.

For initial forest plot establishment (initial grid activation or newly forested plots), the treatment must be within the last 5 years. For re-measured plots recognize only those treatments that have occurred since the previous inventory.

When collected: All accessible forest land condition classes (CONDITION CLASS STATUS = 1)

Field width: 2 digits

Tolerance: No errors

MQO: At least 99% of the time

Values:

<u>Code</u>	<u>Definition</u>
00	<u>None</u> - No observable treatment.
10	<u>Cutting</u> - The removal of one or more trees from a stand.
20	<u>Site preparation</u> - Clearing, slash burning, chopping, disking, bedding, or other practices clearly intended to prepare a site for either natural or artificial regeneration.
30	<u>Artificial regeneration</u> - Following a disturbance or treatment (usually cutting), a new stand where at least 50% of the live trees present resulted from planting or direct seeding.
40	<u>Natural regeneration</u> - Following a disturbance or treatment (usually cutting), a new stand where at least 50% of the live trees present (of any size) were established through the growth of existing trees and/or natural seeding or sprouting.
50	<u>Other silvicultural treatment</u> - The use of fertilizers, herbicides, girdling, pruning, or other activities (not covered by codes 10-40) designed to improve the commercial value of the residual stand, or chaining, which is a practice used on woodlands to encourage wildlife forage.

#### 2.5.18 TREATMENT YEAR 1

Record the year in which TREATMENT 1 occurred.

When collected: When TREATMENT 1 > 00

Field width: 4 digits

Tolerance: +/- 1 year for measurement cycles of 5 years

+/- 2 years for measurement cycles of > 5 years

MQO: At least 99% of the time

Values: Since the previous plot visit, or the past 5 years for plots visited for the first time

#### 2.5.19 TREATMENT 2

If a stand has experienced more than one treatment, record the second treatment here. See TREATMENT 1 for coding instructions; code 00 if none.

#### 2.5.20 TREATMENT YEAR 2

Record the year in which TREATMENT 2 occurred. See TREATMENT YEAR 1 for coding instructions.

#### 2.5.21 TREATMENT 3

If a stand has experienced more than two treatments, record the third treatment here. See TREATMENT 1 for coding instructions; code 00 if none.

#### 2.5.22 TREATMENT YEAR 3

Record the year in which TREATMENT 3 occurred. See TREATMENT YEAR 1 for coding instructions.

### 2.5.23 PHYSIOGRAPHIC CLASS

Record the code that best describes the PHYSIOGRAPHIC CLASS of the condition within the plot area; land form, topographic position, and soil generally determine physiographic class.

When collected: All accessible forest land condition classes (CONDITION CLASS STATUS = 1)

Field width: 2 digits

Tolerance: No errors

MQO: At least 80% of the time

Values: Continue on next page

- Xeric** Sites that are normally low or deficient in moisture available to support vigorous tree growth. These areas may receive adequate precipitation, but experience a rapid loss of available moisture due to runoff, percolation, evaporation, etc.
- 11 Dry Tops - Ridge tops with thin rock outcrops and considerable exposure to sun and wind.
- 12 Dry Slopes - Slopes with thin rock outcrops and considerable exposure to sun and wind. Includes most steep slopes with a southern or western exposure.
- 13 Deep Sands - Sites with a deep, sandy surface subject to rapid loss of moisture following precipitation. Typical examples include sand hills, sites along the beach and shores of lakes and streams, and many deserts.
- 19 Other Xeric - All dry physiographic sites not already described.
- Mesic** Sites that have moderate but adequate moisture available to support vigorous tree growth except for periods of extended drought. These sites may be subjected to occasional flooding during periods of heavy or extended precipitation.
- 21 Flatwoods - Flat or fairly level sites outside flood plains. Excludes deep sands and wet, swampy sites.
- 22 Rolling Uplands - Hills and gently rolling, undulating terrain and associated small streams. Excludes deep sands, all hydric sites, and streams with associated flood plains.
- 23 Moist Slopes and Coves - Moist slopes and coves with relatively deep, fertile soils. Often these sites have a northern or eastern exposure and are partially shielded from wind and sun. Includes moist mountain tops and saddles.
- 24 Narrow Flood plains/Bottomlands - Flood plains and bottomlands less than 1/4-mile in width along rivers and streams. These sites are normally well drained but are subjected to occasional flooding during periods of heavy or extended precipitation. Includes associated levees, benches, and terraces within a 1/4 mile limit. Excludes swamps, sloughs, and bogs.
- 25 Broad Flood plains/Bottomlands - Flood plains and bottomlands 1/4 mile or wider in width along rivers and streams. These sites are normally well drained but are subjected to occasional flooding during periods of heavy or extended precipitation. Includes associated levees, benches, and terraces. Excludes swamps, sloughs, and bogs with year-round water problems.
- 29 Other Mesic - All moderately moist physiographic sites not already described.
- Hydric** Sites that generally have a year-round abundance or over-abundance of moisture. Hydric sites are very wet sites where excess water seriously limits both growth and species occurrence. (Codes continue next page)

- 31 Swamps / Bogs - Low, wet, flat forested areas usually quite extensive that are flooded for long periods of time except during periods of extreme drought. Excludes cypress ponds and small drains.
- 32 Small Drains - Narrow, stream-like, wet strands of forest land often without a well-defined stream channel. These areas are poorly drained or flooded throughout most of the year and drain the adjacent higher ground.
- 33 Bays and wet pocosins - Low, wet, boggy sites characterized by peaty or organic soils. May be somewhat dry during periods of extended drought. Examples include the Carolina bays in the southeast US.
- 34 Beaver ponds
- 35 Cypress ponds
- 39 Other hydric - All other hydric physiographic sites.

2.5.24 PRESENT NONFOREST LAND USE

Record this attribute when area sampled and classified at last inventory as accessible forest land is now nonforest land. The area that has changed is a new, separate condition class. It should not be considered part of any nonforest land condition class(es) sampled during the previous inventory that may still be present. Instructions in Sections 2.1 and 2.4 apply. When classifying these cases, select the classification that, within sampled area, indicates what the majority of this changed area is now if more than one nonforest classes are present.

CORE OPTIONAL - Record the PRESENT NONFOREST LAND USE for all nonforest land conditions (CONDITION CLASS STATUS = 2), regardless of past condition.

When collected: CORE: SAMPLE KIND = 2, previous CONDITION CLASS STATUS = 1, current  
 CONDITION CLASS STATUS = 2  
 CORE OPTIONAL: current CONDITION CLASS STATUS = 2

Field width: 2 digits

Tolerance: No errors

MQO: At least 99% of the time

Values:

- 10 Agricultural land - Land managed for crops, pasture, or other agricultural use. The area must be at least 1.0 acre in size and 120.0 feet wide. Use the 10 code only for cases not better described by one of the following:
  - 11 Cropland
  - 12 Pasture (improved through cultural practices)
  - 13 Idle farmland
  - 14 Orchard
  - 15 Christmas tree plantation
- 20 Rangeland - Land primarily composed of grasses, forbs, or shrubs. This includes lands vegetated naturally or artificially to provide a plant cover managed like native vegetation and does not meet the definition of pasture. The area must be at least 1.0 acre in size and 120.0 feet wide.
- 30 Developed - Land used primarily by humans for purposes other than forestry or agriculture. Use the 30 code only for land not better described by one of the following:
  - 31 Cultural: business, residential, and other places of intense human activity.
  - 32 Rights-of-way: improved roads, railway, power lines, maintained canal
  - 33 Recreation: parks, skiing, golf courses
- 40 Other - Land parcels greater than 1.0 acre in size and greater than 120.0 feet wide, that do not fall into one of the uses described above. Examples include undeveloped beaches, barren land (rock, sand), marshes, bogs, ice, and snow.

2.5.25 SRS PRESENT LAND USE

Record the classification that indicates the land use of the condition.  
 Use codes 10, 30, 40 and 99 only for land not better described by one of the more detailed codes within each category.

When collected: All condition classes  
 Field width: 2 digits  
 Tolerance: No errors  
 MQO: At least 99% of the time  
 Values:

- 01 Accessible timber land [SITE CLASS = 1- 6] (CONDITION CLASS STATUS = 1) - See section 2.2
- 02 Accessible other forest land [SITE CLASS = 7] (CONDITION CLASS STATUS = 1) - See section 2.2
- 10 Agricultural land - Land managed for crops, pasture, or other agricultural use. The area must be at least 1.0 acre in size and 120.0 feet wide (with the exception of windbreak/shelterbelt, which has no minimum width). Use the 10 code only for cases not better described by one of the following:
  - 11 Cropland
  - 12 Pasture (improved through cultural practices)
  - 13 Idle farmland
  - 14 Orchard
  - 15 Christmas tree plantation
  - 16 Maintained wildlife opening
  - 17 Windbreak/Shelterbelt
- 20 Rangeland - Land primarily composed of grasses, forbs, or shrubs. This includes lands vegetated naturally or artificially to provide a plant cover managed like native vegetation and does not meet the definition of pasture. The area must be at least 1.0 acre in size and 120.0 feet wide.
- 30 Developed - Land used primarily by humans for purposes other than forestry or agriculture. Use the 30 code only for land not better described by one of the following:
  - 31 Cultural: business (industrial/commercial), residential, and other places of intense human activity.
  - 32 Rights-of-way: improved roads, railway, power lines, maintained canal
  - 33 Recreation: parks, skiing, golf courses
  - 34 Mining
- 40 Other - Land parcels greater than 1.0 acre in size and greater than 120.0 feet wide, which do not fall into one of the uses described above. Examples include undeveloped beaches, barren land (rock, sand), marshes, bogs, ice, and snow. Use the 40 code only for cases not better described by one of the following:
  - 41 Nonvegetated
  - 42 Wetland
  - 43 Beach
  - 45 Nonforest-Chaparral
- 91 Census Water (CONDITION CLASS STATUS = 4) - See section 2.2
- 92 Noncensus water (CONDITION CLASS STATUS = 3 - See section 2.2
- 99 Nonsampled (CONDITION CLASS STATUS = 5) - See section 2.2

#### 2.5.26 SRS TRACT TOTAL ACRES

Tract size is recorded when the OWNER GROUP is 40 **and** the PRIVATE OWNER INDUSTRIAL STATUS is 0. Include both forest and non-forest acres of the parcel. Do not include separate parcels that the landowner may own elsewhere. If more than one private landowner owns a sample location, record the tract size information for the first forest condition for subsequent forest conditions classified as a private, non-industrial landowner, even though they may be a different owner. See Ownership Procedures in Section 0.3.

Tract size often affects whether a forest stand is likely to be managed and the likelihood of its becoming a source of timber supplies. Very small parcels of land in primarily urban settings are often perceived to be unavailable for timber harvest and many users of FIA data have requested that these areas be identified to eliminate them from the resource base when assessing timber availability. Tract size also provides the ability to track timber removals for parcels of different sizes over time.

When collected: CONDITION CLASS STATUS = 1, OWNER GROUP = 40, and PRIVATE OWNER INDUSTRIAL STATUS = 0

Field width: 5 digits

Tolerance: No errors

MQO: At least 99% of the time

Values: 00001-99999

#### 2.5.27 SRS TRACT PERCENT FOREST

Record the percentage of the tract that is forested. See Ownership Procedures in Section 0.3.

When collected: All conditions when TRACT TOTAL ACRES is collected

Field width: 3 digits

Tolerance: No errors

MQO: At least 99% of the time

Values: 001-100

#### 2.5.28 SRS STAND STRUCTURE

Record the code that best describes the predominant canopy structure for the condition. When determining canopy structure, only consider the vertical position of the dominant and codominant trees in the stand. Do not consider trees that are intermediate or overtopped crown class. As a rule of thumb, a different story should comprise 25% of the stand.

When collected: If CONDITION CLASS STATUS = 1

Field width: 1 digit

Tolerance: No errors

MQO: At least 99% of the time

Values:

- 0 Non-stocked - The condition is less than 10% stocked.
- 1 Single-storied - Most of the dominant/codominant tree crowns form a single canopy (i.e., most of the trees are approximately the same height).
- 2 Multi-storied – Two or more recognizable levels characterize the crown canopy. Dominant/codominant trees of many sizes (diameters and heights) for a multilevel canopy.

**2.5.29 SRS OPERABILITY**

This variable focuses on the viability of operating logging equipment in the vicinity of the condition. Record the most limiting class code that occurs on each forest condition.

When collected: If CONDITION CLASS STATUS = 1

Field width: 1 digit

Tolerance: No errors

MQO: At least 99% of the time

Values:

- 0 No problems
- 1 Seasonal access due to water conditions in wet weather
- 2 Mixed wet and dry areas typical of multi-channeled streams punctuated with dry islands
- 3 Broken terrain, cliffs, gullies, outcroppings, etc., which would severely limit equipment, access or use
- 4 Year-round water problems (includes islands)
- 5 Slopes 20 – 40%
- 6 Slope greater than 40%

**2.5.30 SRS CONDITION SITE CLASS**

Record the site class of the condition. If a site tree is collected for the condition, then the site class will be calculated by the data recorder. If no site tree is collected, then the field crew will estimate the site class.

When collected: If CONDITION CLASS STATUS = 1

Field width: 1 digit

Tolerance: +/- 1 class

MQO: At least 99% of the time

Values: 1-7

**2.5.31 SRS FIRE**

Record the presence or absence of fire on the condition since the last survey or within the last five years for new plots. Evidence of fire must occur within the subplot.

When collected: If CONDITION CLASS STATUS = 1

Field width: 1 digit

Tolerance: No errors

MQO: At least 99% of the time

Values:

- 0 No evidence of fire since last survey
- 1 Evidence of burning (either prescribed or wildfire)

**2.5.32 SRS GRAZING**

Record the presence or absence of domestic animal grazing on the condition since the last survey or within the last five years for new plots. Evidence of grazing must occur within the subplot.

When collected: If CONDITION CLASS STATUS = 1

Field width: 1 digit

Tolerance: No errors

MQO: At least 99% of the time

Values:

- 0 No evidence of livestock use (by domestic animals)
- 1 Evidence of grazing (including dung, tracks, trails, etc.)

2.5.33 SRS CUTTING TYPE 1,2,3

Record the code indicating the type of cutting that has occurred on the condition.

When collected: When TREATMENT 1, 2 or 3 = 10

Field width: 2 digits

Tolerance: No errors

MQO: At least 99% of the time

Values: See next page

- 11 Clearcut harvest – The removal of the majority of the merchantable trees in a stand; residual stand stocking is under 50 percent.
- 12 Partial harvest – Removal primarily consisting of highest quality trees. Residual consists of lower quality trees because of high grading or selection harvest. (Ex. uneven aged, group selection, high grading, species selection)
- 13 Seed-tree/shelterwood harvest – Crop trees are harvested leaving seed source trees either in a shelterwood or seed tree.  
Also includes the final harvest of the seed trees.
- 14 Commercial thinning – The removal of trees (usually poletimber sized) from poletimber-sized stands leaving sufficient stocking of growing stock trees to feature in future stand development. Also included are thinning in sawtimber-sized stands where poletimber-sized (or log-sized) trees have been removed to improve quality of those trees featured in a final harvest.
- 15 Timber Stand Improvement (cut trees only) – The cleaning, release, or other stand improvement involving non-commercial cutting applied to an immature stand that leaves sufficient stocking. Use code 50 for herbicide, girdling, and other TSI treatments that **do not involve cutting**. Use code 14 for commercial thinnings.
- 16 Salvage cutting -- The harvesting of dead or damaged trees or of trees in danger of being killed by insects, disease, flooding, or other factors in order to save their economic value.

### 3.0 SUBPLOT INFORMATION

Each subplot is described by a series of area parameters relating to topographic features and existing cover type. These data also relate to the microplot, since the microplot is contained within the subplot perimeter.

#### 3.1 SUBPLOT NUMBER

Record the code corresponding to the number of the subplot.

When Collected: All subplots  
 Field width: 1 digit  
 Tolerance: No errors  
 MQO: At least 99% of the time  
 Values:

- 1 Center subplot
- 2 North subplot
- 3 Southeast subplot
- 4 Southwest subplot

#### 3.2 SUBPLOT/MACROPLOT STATUS

Indicate whether or not this subplot currently has at least one accessible forest land condition class. In regions measuring the CORE OPTIONAL macroplot, indicate whether or not this macroplot currently has at least one forested condition class.

When collected: All subplots  
 Field width: 1 digit  
 Tolerance: No errors  
 MQO: At least 99% of the time  
 Values:

- 1 Sampled – at least one accessible forest land condition present on subplot
- 2 Sampled – no accessible forest land condition present on subplot
- 3 Nonsampled
- 4 Sampled – QA crew did not measure trees, saplings, or seedlings. QA crew did measure all other data items (condition, boundary, and subplot-level data). For use only on check plots (QA STATUS = 2 - 6). Not a legal entry on production plots (QA STATUS = 1 or 7).

#### 3.3 SUBPLOT NONSAMPLED REASON

For entire subplots that cannot be sampled, record one of the following reasons.

When collected: When SUBPLOT/MACROPLOT STATUS = 3  
 Field width: 2 digits  
 Tolerance: No errors  
 MQO: At least 99% of the time  
 Values: 01 – 11 (descriptions continue on next page)

- 01 Outside U.S. boundary – Assign this code to condition classes beyond the U.S. border (Texas border counties only).
- 02 Denied access area – Any area within the sampled area of a plot to which access is denied by the legal owner, or to which an owner of the only reasonable route to the plot denies access. There are no minimum area or width requirements for a condition class delineated by denied access. Because a denied-access condition can become accessible in the future, it remains in the sample and is re-examined at the next occasion to determine if access is available. In some regions denied access plots may be replaced; check with the field supervisor regarding regional protocols for plot replacement.

- 03 Hazardous situation – Any area within the sampled area on plot that cannot be accessed because of a hazard or danger, for example cliffs, quarries, strip mines, illegal substance plantations, temporary high water, etc. Although the hazard is not likely to change over time, a hazardous condition remains in the sample and is re-examined at the next occasion to determine if the hazard is still present. There are no minimum size or width requirements for a condition class delineated by a hazardous condition. In some regions hazardous plots may be replaced; check with the field supervisor regarding regional protocols for plot replacement.
- 04 Time limitation – This code applies to full subplots that cannot be sampled due to a time restriction. This code is reserved for areas with limited access, and in situations where it is imperative for the crew to leave before the plot can be completed (e.g., scheduled helicopter rendezvous). Use of this code requires notification to the field supervisor. This code should not be used for an entire plot (use code 8 [skipped visit] when an entire plot is skipped; see Section 1.5).
- 05 Lost data – The plot data file was discovered to be corrupt after a panel was completed and submitted for processing. This code is assigned to entire plots or full subplots that could not be processed, and is applied at the time of processing after notification to the region. Note: This code is for office use only.
- 10 Other – This code is used whenever a plot or condition class is not sampled due to a reason other than one of the specific reasons already listed. A field note is required to describe the situation. SRS Note: OFFICE USE ONLY – valid only when PLOT NONSAMPLED REASON = 11. This code should **only** be used when the PC falls outside the state boundary. Valid in state border counties only.
- 11 Ocean – Plot falls in ocean water below mean high tide line.

#### 3.4 SUBPLOT CENTER CONDITION

Record the CONDITION CLASS NUMBER of the condition class at the subplot center.

When collected: All subplots  
Field width: 1 digit  
Tolerance: No errors  
MQO: At least 99% of the time  
Values: 1 to 9

#### 3.5 MICROPLOT CENTER CONDITION

Record the CONDITION CLASS NUMBER of the condition class at the microplot center.

When collected: All microplots  
Field width: 1 digit  
Tolerance: No errors  
MQO: At least 99% of the time  
Values: 1 to 9

#### 3.6 SUBPLOT SLOPE

Record the angle of slope across the subplot to the nearest 1 percent. SUBPLOT SLOPE is determined by sighting the clinometer along a line parallel to the average incline (or decline) of each subplot. This angle is measured along the shortest pathway down slope before the drainage direction changes. To measure SUBPLOT SLOPE, Observer 1 should stand at the uphill edge of the subplot and sight Observer 2, who stands at the downhill edge of the subplot. Sight Observer 2 at the same height as the eye-level of Observer 1. Read the slope directly from the percent scale of the clinometer:

- If slope changes gradually across the subplot, record an average slope.
- If slope changes across the subplot but the slope is predominantly of one direction, code the predominant slope percentage rather than the average.
- If the subplot falls directly on or straddles a canyon bottom or narrow ridge top, code the average slope of the side hill(s).

- If the subplot falls on a canyon bottom or on a narrow ridge top, but most of the area lies on one side hill, code the slope of the side hill where most of the area lies.

When collected: All subplots with at least one accessible forest land condition present on subplot  
(SUBPLOT/MACROPLOT STATUS = 1)

Field width: 3 digits

Tolerance: +/- 10%

MQO: At least 90% of the time

Values: 000, 005 to 155

### 3.7 SUBPLOT ASPECT

Record the aspect across the subplot, to the nearest 1 degree. SUBPLOT ASPECT is determined along the direction of slope for land surfaces with at least 5 percent slope in a generally uniform direction. SUBPLOT ASPECT is measured with a hand compass along the same direction used to determine slope.

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

When collected: All subplots with at least one accessible forest land condition present on subplot  
(SUBPLOT/MACROPLOT STATUS = 1)

Field width: 3 digits

Tolerance: +/- 10 degrees

MQO: At least 90% of the time

Values:

000	no aspect, slope < 5 percent
001	1 degree
002	2 degrees
.	.
.	.
360	360 degrees, due north

### 3.8 SNOW/WATER DEPTH

Record to the nearest 0.1 foot the average approximate depth of water or snow covering the subplot at the time of data collection. This variable is used to indicate subplots where some variables (e.g., seedling count, total lengths) may be measured with less certainty due to conditions at the time of measurement.

When collected: All subplots with at least one accessible forest land condition present on subplot  
(SUBPLOT/MACROPLOT PLOT STATUS = 1)

Field width: 2 digits (x.y)

Tolerance: +/- 0.5 ft

MQO: At the time of measurement (no MQO after initial date of visit)

Values: 0.0 to 9.9

### 3.9 SUBPLOT/MACROPLOT CONDITION LIST

This is a listing of all condition classes located within the 24.0-foot radius around the subplot center. In regions measuring the CORE OPTIONAL macroplot, this is a listing of all condition classes located within the 58.9-foot radius around the macroplot center. A maximum of four conditions is permitted at any individual subplot / macroplot. If a condition class has already been defined at a previously completed subplot / macroplot, use the same condition class number whenever that condition is encountered. Define new condition classes as they are encountered. If more than one condition class is listed here, boundary data are required. If only one condition class is listed, this condition is

automatically assigned to the subplot center and microplot center. If less than four condition classes occur on this subplot, complete the remainder of this field with zeros. For example, if condition 1 is the only condition class on a subplot, record 1000.

When collected: All plots  
Field width: 4 digits  
Tolerance: No errors  
MQO: At least 99% of the time  
Values: 1000 to 9876

### 3.10 SRS NONNATIVE INVASIVE PLANTS

Identify and code the occurrence of up to four nonnative invasive plants listed below that are found on any accessible forest portion of the subplot. Do not record on nonforest conditions. If more than four plants are found on a subplot, code in order of most cover to least. Stop at four species per subplot. If five species are found on subplot 1, record only four species, even if subplot 2 has none.

The species listed are known to cause ecological problems. All are displacing native forest communities. The impact of invasive species is locally well known, but their abundance, regional impact, range and rate of spread in the environment are not well known. Nomenclature follows USDA NRCS PLANTS National Database (<http://plants.usda.gov/>). The most common synonyms are in parentheses. **The first digit of the code identifies the lifeform of the species in question:**

0=tree	4=grass
2=shrub	5=fern
3=vine	6=forbs, herbs, and other nonwoody species

When collected: All subplots with at least one accessible forest land condition present on subplot (SUBPLOT STATUS = 1 or 9)  
Field width: 4 digits  
Tolerance: no errors  
MQO: At least 90% of the time  
Values: see below; use 0000 for none

**Southern Region Nonnative Invasive Plants** Choose up to four species from this list before recording species from any applicable state species list. Species with an asterisk (\*) have been recommended as prohibited from introduction on National Forest land.

CODE	COMMON NAME	SCIENTIFIC NAME
<b>TREES</b>		
0341	Tree-of-heaven	<u><i>Ailanthus altissima</i></u> *
0345	Silktree, Mimosa	<u><i>Albizia julibrissin</i></u> *
0712	Princesstree, Royal Paulownia	<u><i>Paulownia tomentosa</i></u> *
0993	Chinaberry	<u><i>Melia azedarach</i></u>
0994	Tallowtree, Popcorntree	<u><i>Triadica sebifera, Sapium sebiferum</i></u> *
0997	Russian Olive	<u><i>Elaeagnus angustifolia</i></u>
<b>SHRUBS</b>		
2037	Silverthorn, Thorny Olive	<u><i>Elaeagnus pungens</i></u>
2038	Autumn olive	<u><i>Elaeagnus umbellata</i></u>
2042	Winged Burning Bush	<u><i>Euonymus alata</i></u>
2103	Chinese/European privet	<u><i>Ligustrum sinense</i></u> */ <u><i>L. vulgare</i></u>
2104	Japanese/glossy privet	<u><i>Ligustrum japonicum</i></u> */ <u><i>L. lucidum</i></u>
2105	Bush honeysuckles	<u><i>Lonicera spp.</i></u> *
2113	Sacred bamboo, Nandina	<u><i>Nandina domestica</i></u>
2160	Nonnative roses	<u><i>Rosa spp.</i></u>

CODE	COMMON NAME	SCIENTIFIC NAME
<b>VINES</b>		
3026	Oriental or Asian bittersweet	<u>Celastrus orbiculatus</u>
3030	Nonnative climbing yams – air yam/chinese yam	<u>Dioscorea bulbifera</u> */ <u>D. oppositifolia</u>
3042	Wintercreeper	<u>Euonymus fortunei</u>
3071	English Ivy	<u>Hedera helix</u>
3101	Japanese honeysuckle	<u>Lonicera japonica</u> *
3123	Kudzu	<u>Pueraria Montana var. lobata (Pueraria lobata)</u> *
3211	Nonnative Vincas, Periwinkles	<u>Vinca minor/V. major</u>
3251	Chinese/Japanese wisteria	<u>Wisteria sinensis</u> */ <u>W. floribunda</u>
<b>GRASSES</b>		
4008	Giant reed	<u>Arundo donax</u>
4051	Tall fescue	<u>Lolium arundinaceum</u> *
4055	Cogongrass	<u>Imperata cylindrica</u> *
4080	Nepalese browntop	<u>Microstegium vimineum</u> *
4085	Chinese silvergrass	<u>Miscanthus sinensis</u> *
4130	Nonnative bamboos	<u>Phyllostachys spp., Bambus spp.</u>
<b>FERNS</b>		
5171	Japanese climbing fern	<u>Lygodium japonicum</u> *
<b>FORBS/HERBS/OTHER HERBACEOUS</b>		
6002	Garlic mustard	<u>Alliaria petiolata</u> *
6052	Shrubby lespedeza	<u>Lespedeza bicolor</u>
6053	Chinese lespedeza	<u>Lespedeza cuneata</u> *
6095	Tropical soda apple	<u>Solanum viarum</u> *

#### Florida Nonnative Invasive Plants

The following nonnative invasive plants are only tallied in Florida. Use this list only after first exhausting the regional list to record four plants per subplot. For example: If there are no nonnative species from the regional list above on the subplot, then up to four species from the Florida list can be recorded.

CODE	COMMON NAME	SCIENTIFIC NAME
<b>TREES</b>		
FL02	Australian pine	<u>Casuarina equisetifolia</u>
FL03	Camphor tree	<u>Cinnamomum camphora</u>
FL04	Carrotwood	<u>Cupaniopsis anacardioides</u>
FL06	Melaleuca	<u>Melaleuca quinquenervia</u>
FL08	Schefflera	<u>Schefflera actinophylla</u>
FL09	Java plum	<u>Syzygium cumini</u>
<b>SUBSHRUBS</b>		
FL11	Coral ardisia	<u>Ardisia crenata</u>
FL15	Lantana	<u>Lantana camara</u>
<b>SHRUBS</b>		
FL22	Surinam cherry	<u>Eugenia uniflora</u>
FL26	Common guava	<u>Psidium guajava</u>
FL27	Downy rose myrtle	<u>Rhodomyrtus tomentosa</u>
FL28	Brazilian pepper	<u>Schinus terebinthifolius</u>
FL29	Wetland nightshade	<u>Solanum tampicense</u>
<b>VINES</b>		
FL31	Rosary pea	<u>Abrus precatorius</u>
FL35	Cat's-claw vine	<u>Macfadyena unguis-cati</u>
FL37	Skunk vine	<u>Paederia foetida</u>
<b>GRASSES</b>		
FL46	Napier grass	<u>Pennisetum purpureum</u>
<b>FERNS</b>		
FL54	Old World Climbing fern	<u>Lygodium microphyllum</u>
FL56	Sword fern	<u>Nephrolepis cordifolia</u>
<b>FORBS/HERBS/OTHER HERBACEOUS</b>		
FL64	Hairy indigo	<u>Indigofera hirsuta</u>

3.11 SRS NONNATIVE INVASIVE PERCENT COVERAGE

Record the code that best describes the abundance of each nonnative invasive plant recorded on the subplot.

Rate winter vegetation as if it were in a "leaf-on" condition.

One percent cover of the 24-foot radius subplot is equivalent to a square 4.2 feet on each side, or a circle with a radius of 2.4 feet. Ten percent cover is equivalent to a square 13.4 feet on each side, or a circle with a radius of 7.6 feet.

Only record the coverage on the forested portion of the subplot. For example, 70% of a subplot is nonforest and 30% is forested. If the entire subplot was covered by kudzu, then the NONNATIVE INVASIVE PLANT PERCENT COVERAGE is code 3 (11-50% coverage) for 30%.

When collected: NONNATIVE INVASIVE PLANTS > 0000

Field width: 1 digit

Tolerance: no errors

MQO: At least 90% of the time

Values:

- 1 Trace < 01%
- 2 01-10%
- 3 11-50%
- 4 51-90%
- 5 91-100%

#### 4.0 BOUNDARY REFERENCES

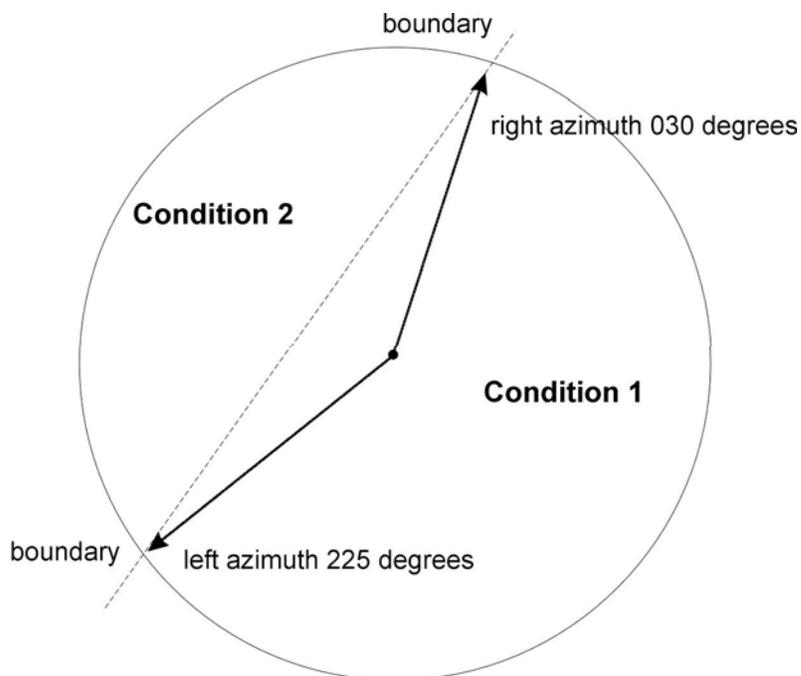
Boundary reference data are used to compute the area for the condition classes sampled on a plot and to remeasure plots. Record all boundaries between condition classes that occur within the sampled (fixed-radius) area on subplots and microplots (and optionally macroplots). Boundaries outside sampled (fixed-radius) areas are not referenced.

In addition to using the recording procedures described herein, sketch maps of condition class boundaries onto the pre-printed plot diagrams on paper field tally sheets.

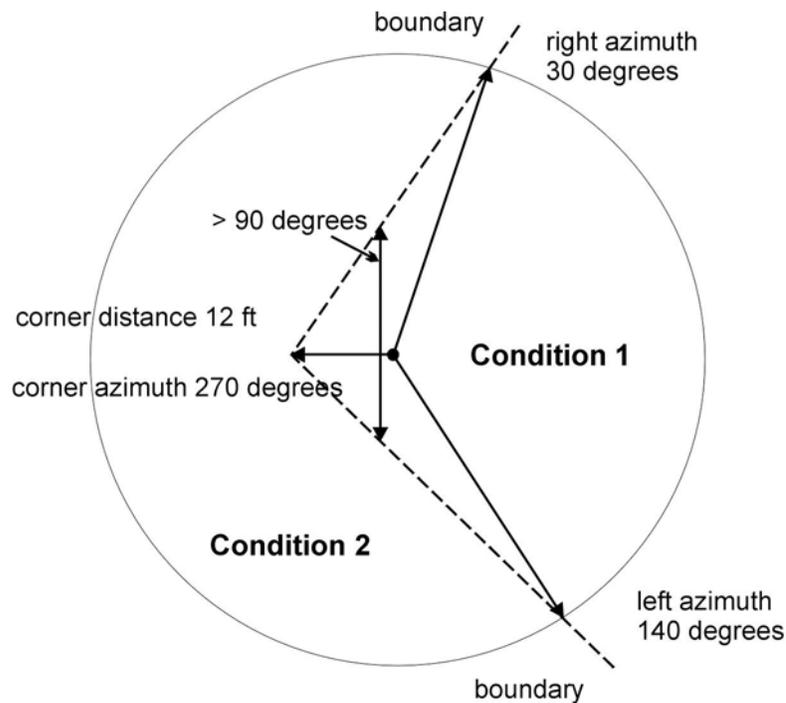
#### 4.1 REFERENCE PROCEDURE

Within the sampled area on each microplot, subplot, and macroplot, reference the approximate boundary of each condition class that differs from the condition classes at a subplot center. Trees selected on these fixed-radius plots are assigned to the actual condition in which they lie regardless of the recorded approximate boundary delineated.

Boundary referencing is done by recording azimuths and distances from subplot center to the reference points and/or from microplot center to the reference points (Figures 15 and 16). Each boundary is marked by a maximum of three points - two where the boundary intersects the subplot circumference or microplot circumference, and one "corner" point between the two end points, if necessary. Only the corner point requires a distance, since the distance from the center to the circumference is always equal to the fixed plot radius.



**Figure 15. How to measure a straight boundary on a microplot, subplot, or macroplot.**



**Figure 16. How to measure a boundary with a corner on a subplot or macroplot.**

Microplot boundaries are referenced to the microplot center, and macroplot boundaries are referenced to the subplot center in the same manner described for subplots. Note that the larger the plot, the greater likelihood of a need for a boundary corner to record boundaries that are not straight lines.

Refer to Sections 2.1 and 2.4 for general condition class delineation guidelines. The following additional rules apply when referencing a boundary within a subplot, microplot, or macroplot:

1. When a boundary between accessible forest land and nonforest land or between two contrasting accessible forest land condition classes is clearly marked, use that feature to define the boundary. Examples of clear demarcation are a fence line, plowed field edge, sharp ridge line, and water's edge along a stream course, ditch, or canal.
2. When a boundary between forest land and nonforest land is not clearly marked by an obvious feature, the boundary should follow the nonforest side of the stems of the trees at the forest edge.
3. When a boundary between two contrasting forest land condition classes is not clearly marked, map along the stems of the contrasting condition. When the boundary between two contrasting forest land condition classes is separated by a narrow linear inclusion (creek, fire line, narrow meadow, unimproved road), establish the boundary at the far edge of the inclusion relative to subplot center.
4. When a plot is remeasured, the crew will examine the boundaries referenced at last inventory. If no change has occurred, the current crew will retain the boundary data that were recorded at last inventory. If a boundary has changed, or a new boundary is present, or the previous crew made an obvious error, record new or updated boundary data. Delete boundaries that are no longer distinct.
5. Although individual MQO's are specified for the azimuths and distances, in practice a crew will be considered 'correct' when the difference in areas as mapped by the original crew and by the QA crew is less than 10 percent of the subplot or microplot area. This allows for slight variations in azimuths or distances due to the approximate nature of mapping procedures.

## 4.2 BOUNDARY DATA

Record the appropriate values for each boundary mapped on the subplot, microplot, or macroplot as follows:

### 4.2.1 SUBPLOT NUMBER

Record the code corresponding to the number of the subplot.

When collected: All boundaries

Field width: 1 digit

Tolerance: No errors

MQO: At least 99% of the time

Values:

- 1 Center subplot
- 2 North subplot
- 3 Southeast subplot
- 4 Southwest subplot

### 4.2.2 PLOT TYPE

Record the code to specify whether the boundary data are for a subplot, microplot, or macroplot.

When collected: All boundaries

Field width: 1 digit

Tolerance: No errors

MQO: At least 99% of the time

Values:

- 1 Subplot boundary
- 2 Microplot boundary
- 3 Macroplot boundary (coded only when macroplots are taken)
- 4 Hectare plot boundary (coded from subplot 1 only)

### 4.2.3 BOUNDARY CHANGE

Remeasurement (SAMPLE KIND = 2) locations only. Record the appropriate code to indicate the relationship between previously recorded and current boundary information.

When collected: SAMPLE KIND = 2, All boundaries

Field width: 1 digit

Tolerance: No errors

MQO: At least 99% of the time

Values:

- 0 No change - boundary is the same as indicated on plot map and/or data collected by a previous crew (BOUNDARY STATUS = 2).
- 1 Real change - new boundary, or boundary data has been changed or deleted to reflect an actual on-the-ground physical change resulting in a difference from the boundaries recorded (BOUNDARY STATUS = 0, 1, 2).
- 2 Cruiser error – new boundary, or boundary has been changed or deleted to correct an error from previous crew (BOUNDARY STATUS = 0, 1, 2).
- 3 Procedural change - new boundary, or boundary has been changed or deleted to reflect a change in variable definition (BOUNDARY STATUS = 0, 1, 2).

4.2.4 CONTRASTING CONDITION

Record the CONDITION CLASS NUMBER of the condition class that contrasts with the condition class located at the subplot center (for boundaries on the subplot or macroplot) or at the microplot center (for boundaries on the microplot), e.g., the condition class present on the other side of the boundary line. See section 3.0 for subplot data.

When collected: All boundaries  
 Field width: 1 digit  
 Tolerance: No errors  
 MQO: At least 99% of the time  
 Values: 1 to 9

4.2.5 LEFT AZIMUTH

Record the azimuth from the subplot, microplot, or macroplot center to the farthest left point (facing the contrasting condition) where the boundary intersects the subplot, microplot, or macroplot circumference.

When collected: All boundaries  
 Field width: 3 digits  
 Tolerance: +/- 5 degrees  
 MQO: At least 90% of the time  
 Values: 001 to 360

4.2.6 CORNER AZIMUTH

Record the azimuth from the subplot, microplot, or macroplot center to a corner or curve in a boundary. If a boundary is best described by a straight line between the two circumference points, then record 000 for CORNER AZIMUTH (000=none).

When collected: All boundaries  
 Field width: 3 digits  
 Tolerance: +/- 5 degrees  
 MQO: At least 90% of the time  
 Values: 000 to 360

4.2.7 CORNER DISTANCE

Record the horizontal distance, to the nearest 1 foot, from the subplot, microplot, or macroplot center to a boundary corner point.

When collected: All boundaries when CORNER AZIMUTH > 000  
 Field width: 3 digits  
 Tolerance: +/- 1 ft  
 MQO: At least 90% of the time  
 Values:

microplot	001 to 007 ft (actual limiting distance is 6.8 ft)
subplot	001 to 024 ft
macroplot	001 to 059 ft (actual limiting distance is 58.9 ft)
hectare	001 to 185 ft

#### 4.2.8 RIGHT AZIMUTH

Record the azimuth from subplot, microplot, or macroplot center to the farthest right point (facing the contrasting condition) where the boundary intersects the subplot, microplot, or macroplot circumference.

When collected: All boundaries

Field width: 3 digits

Tolerance: +/- 5 degrees

MQO: At least 90% of the time

Values: 001 to 360

#### 4.2.9 SRS BOUNDARY STATUS

On SAMPLE KIND = 2 plots only, record the appropriate code indicating if the previous boundary is to be deleted, is a new boundary or is a remeasured boundary with or without change.

When collected: All boundaries on SAMPLE KIND = 2

Field width: 1 digit

Tolerance: No errors

MQO: At least 99% of the time

Values:

0	Deleted boundary record
1	New boundary record
2	Remeasured boundary record (with or without change)



## 5.0 TREE AND SAPLING DATA

Trees at least 5.0 inches in diameter are sampled within the subplot. 'Tally trees' are defined as all live and standing dead trees in accessible forest land condition classes encountered on the subplot the first time a subplot is established, and all trees that grow into a subplot thereafter. These data yield information on tree volume, growth, mortality, and removals; wildlife habitats; forest structure and composition; biomass; and carbon sequestration.

Trees with a diameter at least 1.0 inch but less than 5.0 inches, termed saplings, are sampled within the microplot. 'Tally saplings' are defined as all live saplings in accessible forest land condition classes encountered the first time a microplot is established, and all saplings that grow into each microplot thereafter are included until they grow to 5.0 inches or larger, at which time they are tallied on the subplot and referenced (new AZIMUTH and HORIZONTAL DISTANCE taken) to the subplot center.

For multi-stemmed woodland species, a cumulative DRC is used to compute diameter as described in Sections 5.9 and 5.9.4.

Trees are alive if they have any living parts (leaves, buds, cambium) at or above the point of diameter measurement, either diameter at breast height (DBH) or diameter at root collar (DRC). Trees that have been temporarily defoliated are still alive.

Once tallied, dead trees over 5.0 inches in diameter are tracked until they no longer qualify as standing dead. **Working around dead trees is a safety hazard - crews should exercise extreme caution! Trees that are deemed unsafe to measure should be estimated.**

To qualify as a standing dead tally tree, dead trees must be at least 5.0 inches in diameter, have a bole which has an unbroken ACTUAL LENGTH of at least 4.5 feet, and lean less than 45 degrees from vertical as measured from the base of the tree to 4.5 feet.

The portion of a bole on dead trees that are separated greater than 50 percent (either above or below 4.5 feet), are considered severed and may qualify as Down Woody Material (DWM). See DWM procedures for tally criteria.

For woodland species (Appendix 3) with multiple stems, a tree is considered down if more than 2/3 of the volume is no longer attached or upright; do not consider cut and removed volume. For woodland species with single stems to qualify as a standing dead tally tree, dead trees must be at least 5.0 inches in diameter, be at least 1.0 foot in unbroken ACTUAL LENGTH, and lean less than 45 degrees from vertical.

Live and dead standing tally trees, and partially separated boles of dead tally trees, do not have to be self-supported. They may be supported by other trees, branches, or their crown.

Trees that have been cut above DBH qualify as tally trees, provided they meet the size requirement.

The following apply at remeasurement:

- If at the previous visit a forked tree was recorded as two separate trees but should have been recorded as one tree, delete one tree and correct the diameter for the remaining tree. Give one of the tree data lines a PRESENT TREE STATUS = 0, RECONCILE = 27, and a TREE NOTE. The remaining tree data line receives PRESENT TREE STATUS = 1 or 2 with DIAMETER CHECK = 2, and a TREE NOTE.
- If at the previous visit a forked tree was recorded as one tree but should have been recorded as two separate trees, correct the diameter for the remeasured tree to represent one tree, and add the other fork as a missed tree. Use the existing tree data line to represent one of the stems. PRESENT TREE STATUS = 1 or 2, DIAMETER CHECK = 2, and a TREE NOTE. The second stem would get PRESENT TREE STATUS = 1 or 2, RECONCILE 3 or 4, and a TREE NOTE.

Begin tallying trees at an azimuth of 001 degrees from subplot center and continue clockwise around the subplot. Repeat this sequence for trees on the microplot and again on the annular plot.

If a subplot was installed incorrectly at the previous visit, the current crew should remeasure the subplot in its present location. In cases where individual subplots are lost (cannot be relocated), use the following procedures:

- assign the appropriate present CONDITION CLASS STATUS Code(s) to the new subplot (usually CONDITION CLASS STATUS = 1 or 2)
- assign TREE STATUS = 0 and RECONCILE = 7 to all downloaded trees (i.e., incorrectly tallied at the previous survey)
- assign RECONCILE codes 3 or 4 (i.e., missed live or missed dead) to all trees on the new subplot.
- assign the next TREE RECORD NUMBER.

5.1 SUBPLOT NUMBER

Record the subplot number where the tree occurs. Also record for subplots that have no tally on the subplot or on the microplot either due to a nonforest land use or a forested land use with low stocking. This is done to indicate to the edit check program that the subplot was accounted for and that the data was not lost during the transmission.

When Collected: All live tally trees  $\geq 1.0$  in DBH/DRC and standing dead tally trees  $\geq 5.0$  in DBH/DRC

Field width: 1 digit

Tolerance: No errors

MQO: At least 99% of the time

Values:

- 1 Center subplot
- 2 North subplot
- 3 Southeast subplot
- 4 Southwest subplot

5.2 TREE RECORD NUMBER

Record a code to uniquely and permanently identify each tree on a given subplot. The TREE RECORD NUMBERS must be unique within a subplot – being unique is more important than being sequential. In general, work clockwise from azimuth 001 to 360, and work outwards from subplot center to subplot perimeter. On remeasured plots, use the previously assigned tree number. Saplings tallied on microplots will retain their initially assigned tree number if they grow to tree size. Missed trees will be assigned the next available tree number. DO NOT renumber all plot trees in order to assign a more “correct” tree number to a missed tree. Numbers assigned to trees that are subsequently found to be extra will be dropped and not reused.

If TREE RECORD NUMBERS are not assigned in the field, record 000.

NOTE: If this is a Phase 3 plot, match the trees on this point to the hard copy list provided. Record the three-digit FHM tree number assigned to each standing tree.

When Collected: All live tally trees  $\geq 1.0$  in DBH/DRC and standing dead tally trees  $\geq 5.0$  in DBH/DRC; entry to record no tally on a subplot

Field width: 3 digits

Tolerance: No errors

MQO: At least 99% of the time

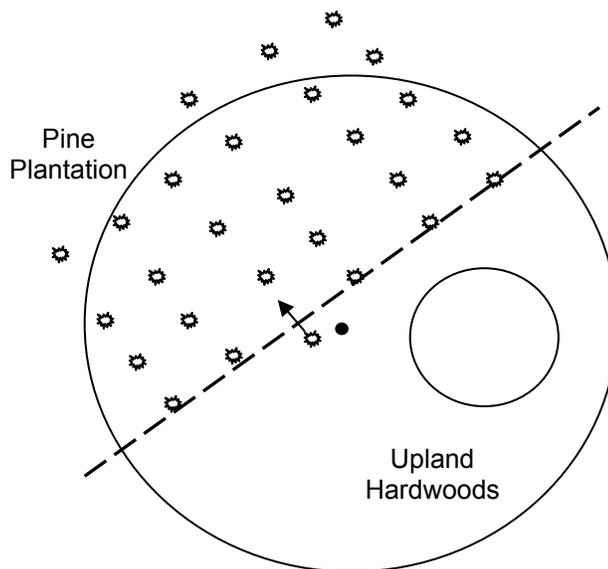
Values: 000 or 001 to 999

5.3 CONDITION CLASS NUMBER

Record the CONDITION CLASS NUMBER in which each tree is located. Often, a referenced boundary is approximate, and trees selected for tally are assigned to the actual condition in which they lie regardless of the recorded approximate boundary (Figure 17).

Also record for subplots that have no tally on the subplot or on the microplot either due to a nonforest land use or a forested land use with low stocking. This is done to indicate to the edit check program that the subplot was accounted for and that the data was not lost during the transmission.

When Collected: All trees and an entry to record no tally on a subplot  
 Field width: 1 digit  
 Tolerance: No errors  
 MQO: At least 99% of the time  
 Values: 1 to 9



**Figure 17. Ragged CONDITION CLASS boundary and tree condition class designation.**

**.5.4 AZIMUTH**

Record the AZIMUTH from the subplot center (for trees greater than or equal to 5.0 inches DBH/DRC) or the microplot center (for trees greater than or equal to 1.0 inch and less than 5.0 inches DBH/DRC), sight the center of the base of each tree with a compass. Sight to the geographic center for multi-stemmed woodland species (Appendix 3). The geographic center is a point of equal distance between all tallied stems for a given woodland tree. Record AZIMUTH to the nearest degree. Use 360 for north.

When Collected: All live tally trees  $\geq 1.0$  in DBH/DRC and standing dead tally trees  $\geq 5.0$  in DBH/DRC  
 Field width: 3 digits  
 Tolerance: +/- 3 degrees  
 MQO: At least 90% of the time  
 Values: 001 to 360

**5.5 HORIZONTAL DISTANCE**

Record the measured HORIZONTAL DISTANCE, to the nearest 0.1 foot, from the subplot center (for trees greater than or equal to 5.0 inches DBH/DRC) or microplot center (for trees greater than or equal to 1.0 inch and less than 5.0 inches DBH/DRC) to the pith of the tree at the base. For all multi-stemmed woodland trees (woodland species indicated in Appendix 3), the HORIZONTAL DISTANCE is measured from subplot or microplot center to the "geographic center" of the tree. The geographic center is a point of equal distance between all tallied stems for a given woodland tree.

When Collected: All live tally trees  $\geq 1.0$  in DBH/DRC and standing dead tally trees  $\geq 5.0$  in DBH/DRC  
 Field width: 3 digits (xx.y)  
 Tolerance: Microplot: +/- 0.2 ft  
                   Microplot woodland species: +/- 0.4 ft  
                   Subplot: +/- 1.0 ft  
                   Subplot woodland species: +/- 2.0 ft  
 MQO: At least 90% of the time  
 Values: Microplot: 00.1 to 06.8  
           Subplot: 00.1 to 24.0

## 5.6 PREVIOUS TREE STATUS

If not downloaded from the previous inventory, record PREVIOUS TREE STATUS for each remeasured tally tree. This code is used to track the status of sample trees over time. This information is needed to correctly assign volume information to the proper component of volume change.

When collected: On remeasurement plots (SAMPLE KIND = 2), all previously tallied trees  $\geq 1.0$  in DBH

Field width: 1 digit

Tolerance: No errors

MQO: At least 95% of the time

Values:

- 1 Live Tree – alive at the previous inventory
- 2 Dead tree – standing dead tree at the previous inventory

## 5.7 PRESENT TREE STATUS

Record a current PRESENT TREE STATUS for each tallied tree; this code is used to track the status of sample trees over time: as they first appear, as ingrowth, as they survive, and when they die or are removed. This information is needed to correctly assign volume information to the proper component of volume change.

When Collected: All new live tally trees  $\geq 1.0$  in DBH/DRC

All new dead tally trees  $\geq 5.0$  in

On remeasurement plots, all previously tallied trees

Field width: 1 digit

Tolerance: No errors

MQO: At least 95% of the time

Values:

- 0 No status – tree is not presently in the sample (remeasurement plots only). Tree was incorrectly tallied at the previous inventory, currently is not tallied due to definition or procedural change, or is not tallied due to natural causes (physically moved off plot). Requires RECONCILE code = 5-9.
- 1 Live tree – any live tree (new, remeasured or ingrowth)
- 2 Dead tree – any dead tree (new, remeasured, or ingrowth), regardless of cause of death. Includes all previously standing dead trees that no longer qualify as standing dead, as well as trees killed by silvicultural or land clearing activity, and are assumed not to have been utilized.
- 3 Removed – a tree that has been cut and removed by direct human activity related to harvesting, silviculture or land clearing (remeasurement plots only). The tree is assumed to have been utilized.

Note: On remeasured plots, crews must collect new AZIMUTH and HORIZONTAL DISTANCE information from the subplot center for microplot saplings that grow to become subplot trees. For live subplot trees that shrink to become live saplings on the microplot, crews must collect new AZIMUTH and HORIZONTAL DISTANCE information from the microplot center.

### 5.7.1 RECONCILE

For remeasurement locations only, record a RECONCILE code for any new tally tree that was not tallied in the previous inventory, and for all no status remeasurement trees (PRESENT TREE STATUS = 0). This code is used to identify the reason a new tree appeared in the inventory, and identify the reason a remeasurement tree no longer qualifies as a tally tree. This information is needed to correctly assign volume information to the proper component of volume change.

When Collected: On SAMPLE KIND = 2; all new live tally trees  $\geq 1.0$  in DBH/DRC (PRESENT TREE STATUS = 1 and no PREVIOUS TREE STATUS), all new dead tally trees  $\geq 5.0$  in (PRESENT TREE STATUS = 2 and no PREVIOUS TREE STATUS), all no status trees (PRESENT TREE STATUS = 0)

Field width: 1 digit

Tolerance: No errors

MQO: At least 95% of the time

Values:

Codes 1-4 are valid for new trees on the plot:

- 1 Ingrowth or reversions – either a new tally tree not qualifying as through growth or a new tree on land that was formerly nonforest and now qualifies as forest land (reversion or encroachment).
- 2 Through growth – new tally tree 5.0 inches DBH/DRC and larger, within the microplot, which was not missed at the previous inventory (i.e. went from seedling to pole between surveys).
- 3 Missed live – a live tree missed at previous inventory and that is live or dead now.
- 4 Missed dead – a dead tree missed at previous inventory that is dead now.

Codes 5-9 are valid for remeasured trees that no longer qualify as tally:

- 5 Shrank – live tree that shrank below threshold diameter on microplot/subplot/macroplot.
- 6 Missing (moved) – tree was correctly tallied in previous inventory, but has now moved beyond the radius of the plot due to natural causes (i.e., small earth movement, hurricane). Tree must be either live before and still alive now or dead before and dead now. If tree was live before and now dead, this is a mortality tree and should have PRESENT TREE STATUS = 2 (not 0).
- 7 Cruiser error – erroneously tallied at previous inventory.
- 8 Procedural change – tree was tallied at the previous inventory, but is no longer tallied due to a definition or procedural change.
- 9 Tree was sampled before, but now the area where the tree was located is nonsampled. All trees on the nonsampled area have RECONCILE = 9.

Code 5 is used to indicate live trees that shrink below the diameter threshold on the microplot/subplot/macroplot. For example, if a live remeasurement tree shrinks below the 5.0 inch DBH/DRC, then record the following combination of codes: PREVIOUS TREE STATUS = 1, PRESENT TREE STATUS = 0, RECONCILE = 5. If a live measured tree shrinks below the 5.0 inch threshold on the subplot and is currently greater than or equal to 1.0 inch on the microplot, then record PREVIOUS TREE STATUS = 1, PRESENT TREE STATUS = 1. Record all required items for a tally sapling. Use the tree coding guide in Appendix 8 to determine the national coding method for remeasurement trees.

#### 5.7.2 STANDING DEAD

Record the code that describes whether or not a tree qualifies as standing dead. To qualify as a standing dead tally tree, dead trees must be at least 5.0 inches in diameter, have a bole which has an unbroken ACTUAL LENGTH of at least 4.5 feet, and lean less than 45 degrees from vertical as measured from the base of the tree to 4.5 feet. See Figures 18-20 for examples.

“Unbroken” is defined as at least 50 percent attached to the original source of growth. The degree of lean on dead trees with partially separated (i.e., 1 to 50 percent) boles is measured from the base of the tree to the top of ACTUAL LENGTH.

Portions of boles on dead trees that are separated greater than 50 percent (either above or below 4.5 feet), are considered severed and are included in Down Woody Material (DWM) if they otherwise meet DWM tally criteria.

For woodland species (Appendix 3) with multiple stems, a tree is considered down if more than 2/3 of the volume is no longer attached or upright; do not consider cut and removed volume. For woodland species with single stems to qualify as a standing dead tally tree, dead trees must be at least 5.0 inches in diameter, be at least 1.0 foot in unbroken ACTUAL LENGTH, and lean less than 45 degrees from vertical.

Live and dead standing tally trees, and partially separated boles of dead tally trees, do not have to be self-supported. They may be supported by other trees, branches, or their crown.

When collected: SAMPLE KIND = 2 only: All dead tally trees (PRESENT TREE STATUS = 2)

Field width: 1 digit

Tolerance: No errors

MQO: At least 99% of the time

Values:

- 0 No – tree does not qualify as standing dead.
- 1 Yes – tree does qualify as standing dead.

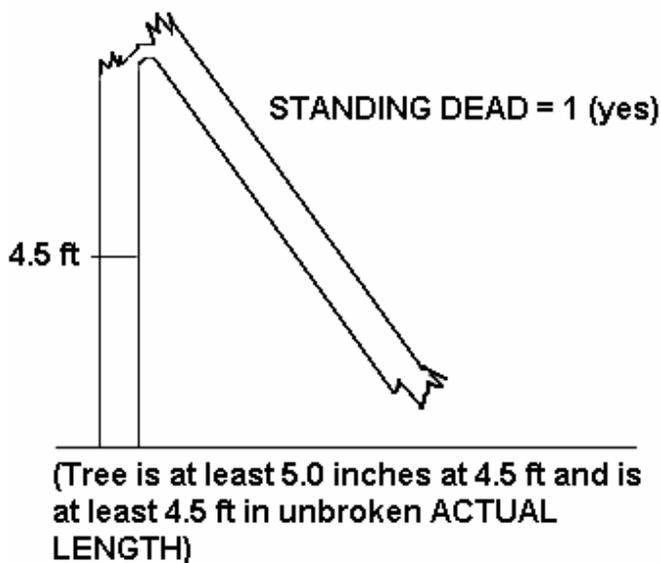


Figure 18. Example of an unbroken bole to 4.5 feet.

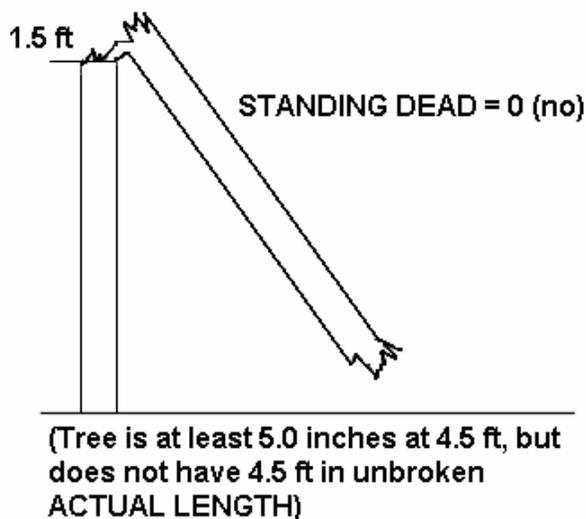


Figure 19. Example of an unbroken length of < 1.5 feet.

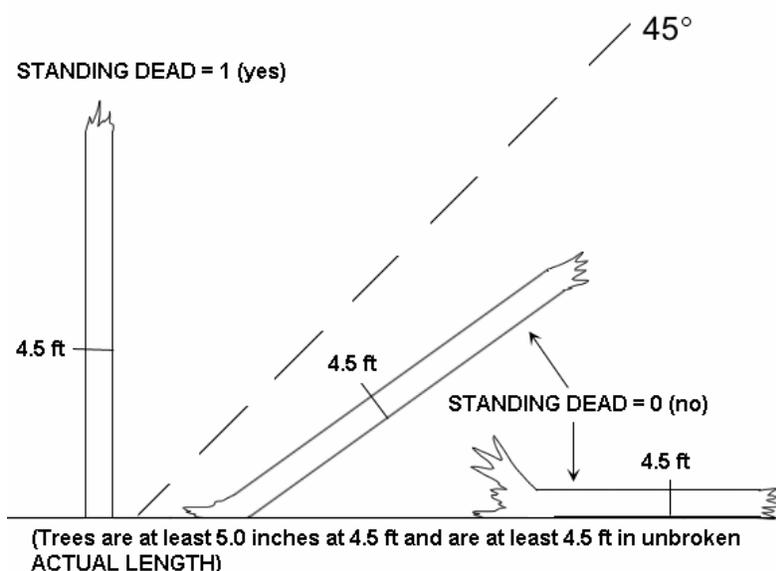


Figure 20. Other examples of dead trees.

5.7.3 MORTALITY (CORE OPTIONAL)

Record a mortality code for any tree that was live within the past five years but has died, regardless of cause of death. This information is needed to correctly assign volume information to the proper component of volume change.

When Collected: All standing dead trees 5.0 in DBH/DRC and larger that were live within the past 5 years if no previous inventory (PRESENT TREE STATUS = 2 on SAMPLE KIND = 1 or 3 plots).

Field width: 1 digit

Tolerance: No errors

MQO: At least 85% of the time

Values:

- 0 No - tree does not qualify as mortality.
- 1 Yes - tree does qualify as mortality.

## 5.8 SPECIES

Record the appropriate SPECIES code from the list in Appendix 3. If you encounter a species not listed in Appendix 3 and are not sure if it should be tallied as a tree, consult your Field Supervisor. If the species cannot be determined in the field, tally the tree, but bring branch samples, foliage, cones, flowers, bark, etc. to your supervisor for identification. If possible, collect samples outside the subplots from similar specimens and make a note to correct the SPECIES code later. Use code 0299 for unknown dead conifer, 0998 for unknown dead hardwood when the genus or species codes cannot be used, and 0999 for other or unknown live tree. The generic code should only be used when you are sure the species is on the species list, but you cannot differentiate among acceptable species. This is often the case with standing dead trees on newly established plots. In this case use the sample collections procedures described earlier in this paragraph. The species code list in Appendix 3 includes all tree species tallied in the Continental U.S. and Alaska. Species designated East/West are commonly found in those regions, although species designated for one region may occasionally be found in another. Species marked as Woodland designate species where DRC is measured instead of DBH. Species that have an "X" in the Core column are tallied in all regions. All other species on the list are "core optional."

When Collected: All live tally trees  $\geq 1.0$  in DBH/DRC and standing dead tally trees  $\geq 5.0$  in DBH/DRC  
Field width: 4 digits  
Tolerance: No errors  
MQO: At least 99% of the time for genus, at least 95% of the time for species  
Values: See Appendix 3

## 5.9 DIAMETER

Diameters are measured at either breast height (DBH) or at the root collar (DRC). Species requiring DRC, referred to as woodland species, are denoted with a "w" in Appendix 3. Trees with diameters between 1.0- and 4.9-inches are measured on the 6.8-foot radius microplot, those with diameters of 5.0-inches and larger are measured on the 24-foot radius subplots.

In order to accurately remeasure diameter (DBH or DRC) at the same point on the tree bole at successive visits, regions have the option of measuring and recording the distance from the ground to the point of diameter measurement, or marking the point of measurement with a scribe, crayon, paint, or aluminum nail. When marking trees for the first time, measure the diameter after the mark is in place. Use caution to avoid damaging trees with scribes and nails. Do not scribe or nail trees less than 3.0-inches in diameter, or species vulnerable to introduction of pathogens (e.g., aspen). Do not penetrate the cambium when using a bark scribe.

Remeasurement trees:

When remeasuring the diameter of a tree tallied at a previous survey, always take the measurement at the location monumented by the previous crew unless it is not physically possible (e.g., tree buried by mudslide), there is an abnormality at the previous DIAMETER measurement point, or the previous location is more than 12 inches beyond where the diameter should be measured according to current protocols (either because protocols have changed or the previous crew made a mistake). Assign a DIAMETER CHECK code of 2 whenever the point of measurement is moved.

When Collected: All live tally trees  $\geq 1.0$  in DBH/DRC and standing dead tally trees  $\geq 5.0$  in DBH/DRC  
Field width: 4 digits (xxx.y)  
Tolerance: +/- 0.1 in per 20.0 in increment of measured diameter on all live trees and dead trees with  
DECAY CLASS = 1, 2  
+/- 1.0 in per 20.0 in increment of measured diameter on dead trees with DECAY CLASS  
= 3, 4, 5  
For woodland species: +/- 0.2 in per stem  
MQO: At least 95% of the time. For example: a tree with a diameter of 41.0 in would have a tolerance of plus or minus 0.3 in. (Note: the MQO for point of measurement is +/- 0.2 in when the tree is first measured and within 1 ft of the location established by the previous crew when the tree is remeasured.)  
Values: 001.0 to 999.9

5.9.1 PREVIOUS DIAMETER AT BREAST HEIGHT

This is the DBH assigned at the previous survey. It has been downloaded from the previous inventory. Any change made to this field signifies an error at the time of the previous inventory. DIAMETER CHECK should be set to 2 and an explanation is required in the notes if previous DBH is changed.

5.9.2 DIAMETER AT BREAST HEIGHT (DBH)

Unless one of the following special situations is encountered, measure DBH at 4.5 feet above the ground line on the uphill side of the tree. Round each measurement down to the last 0.1 inch. For example, a reading of 3.68 inches is recorded as 3.6 inches.

Special DBH situations:

1. **Forked tree:** In order to qualify as a fork, the stem in question must be at least 1/3 the diameter of the main stem and must branch out from the main stem at an angle of 45 degrees or less. Forks originate at the point on the bole where the piths intersect. Forked trees are handled differently depending on whether the fork originates below 1.0 foot, between 1.0 and 4.5 feet, or above 4.5 feet.

- **Trees forked below 1.0 foot.** Trees forked below 1.0 foot are treated as distinctly separate trees (Figure 21). Distances and azimuths are measured individually to the center of each stem where it splits from the stump (Figure 24 A-C). DBH is measured for each stem at 4.5 feet above the ground. When stems originate from pith intersections below 1 foot, it is possible for some stems to be within the limiting distance of the microplot or subplot, and others to be beyond the limiting distance. If stems originating from forks that occur below 1.0 foot fork again between 1.0 and 4.5 feet (Figure 24-E), the rules in the next paragraph apply.

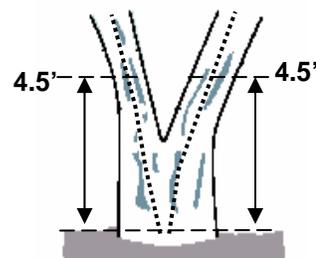


Figure 21. Forked below 1.0 ft.

- **Trees forked between 1.0 foot and 4.5 feet.** Trees forked between 1.0 foot and 4.5 feet are also counted as separate trees (Figure 22), but only one distance and azimuth (to the central stump) is recorded for each stem (Figure 24 D-F). Although a single azimuth and distance applies to all, multiple stems should be recorded as they occur in clockwise order (from front to back when one stem is directly in front of another). The DBH of each fork is measured at a point 3.5 feet above the pith intersection. When forks originate from pith intersections between 1.0 and 4.5 feet, the limiting distance is the same for all forks--they are either all on, or all off the plot.

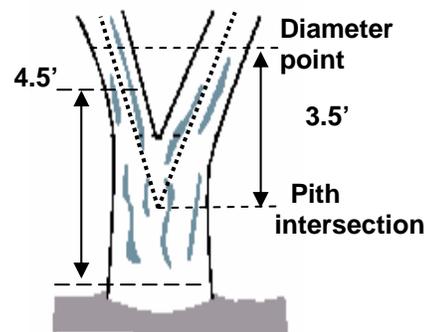


Figure 22. Forked between 1.0-4.5 ft.

Multiple forks are possible if they all originate from approximately the same point on the main stem. In such cases, measure DBH on all stems at 3.5 feet above the common pith intersection (Figure 24-F).

Once a stem is tallied as a fork that originated from a pith intersection between 1.0 and 4.5 feet, do not recognize any additional forks that may occur on that stem. Measure the diameter of such stems just below the base of stem separation as shown in Figure 24-E (i.e., do not move the point of diameter the entire 3.5 feet above the first fork) for both saplings and poletimber/sawtimber trees.

- **Trees forked at or above 4.5 feet.** Trees forked at or above 4.5 feet count as one single tree (Figure 23). If a fork occurs at or immediately above 4.5 feet, measure diameter below the fork just beneath any swelling that would inflate DBH.

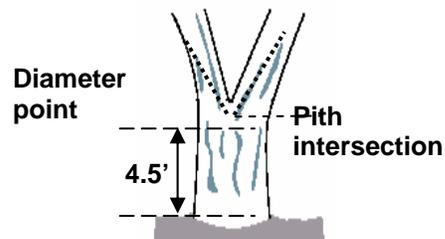


Figure 23. One tree.

2. Stump sprouts: Stump sprouts originate between ground level and 4.5 feet on the boles of trees that have died or been cut. Stump sprouts are handled the same as forked trees, with the exception that stump sprouts are not required to be 1/3 the diameter of the dead bole. Stump sprouts originating below 1.0 foot are measured at 4.5 feet from ground line. Stump sprouts originating between 1.0 foot and 4.5 feet are measured at 3.5 feet above their point of occurrence. As with forks, rules for measuring distance and azimuth depend on whether the sprouts originate above or below 1.0 foot. For multi-stemmed woodland species, treat all new sprouts as part of the same new tree.

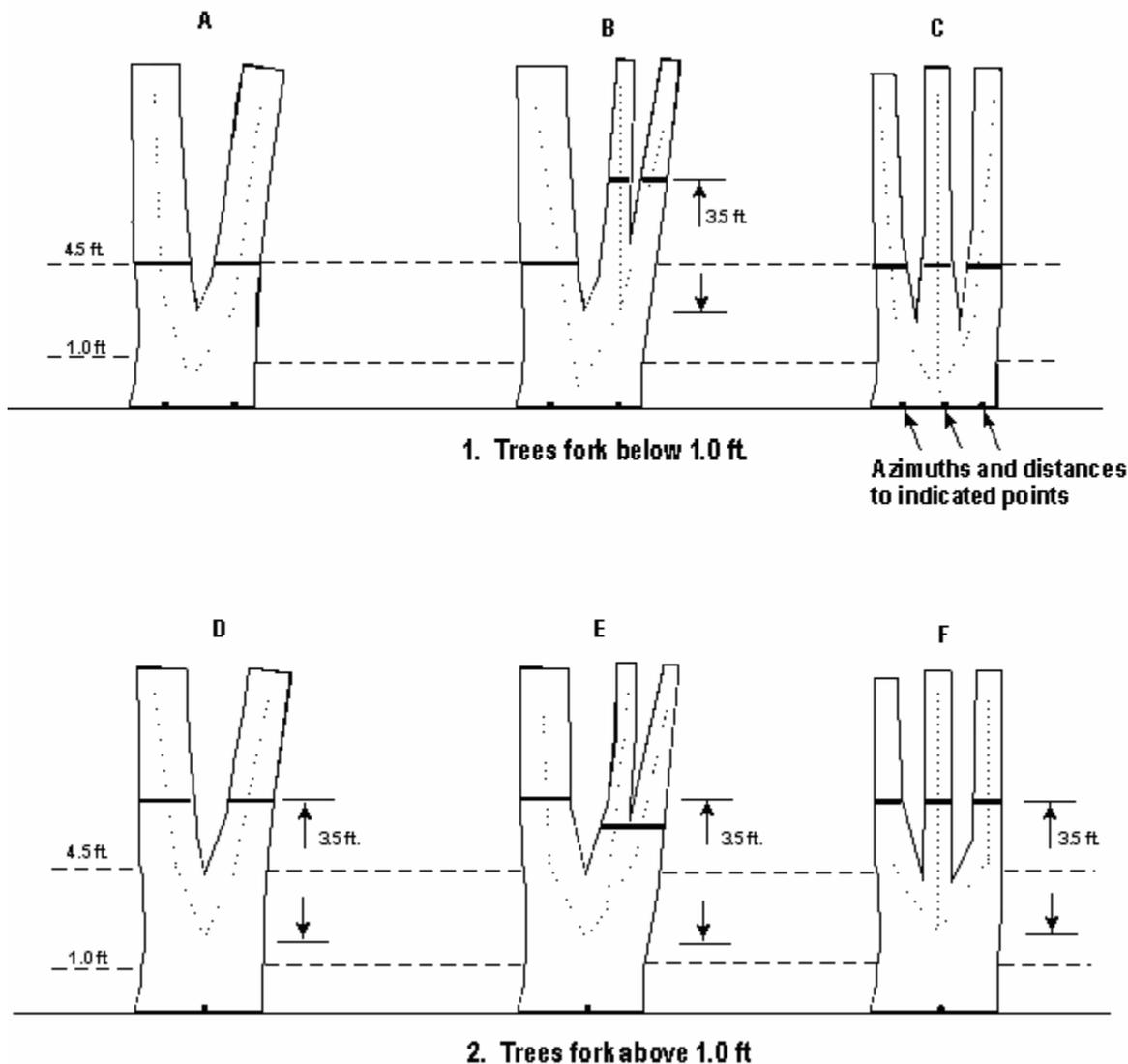


Figure 24. Summary of where to measure DBH, distance, and azimuth on forked trees.

3. Tree with butt-swell or bottleneck: Measure these trees 1.5 feet above the end of the swell or bottleneck if the swell or bottleneck extends 3.0 feet or more above the ground (Figure 25). Use a prism with a known BAF to determine diameter on trees where the diameter measurement point is too high to reach. See the coding summary for complete directions for using a prism.

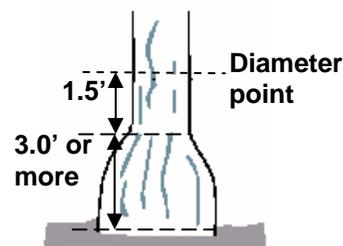
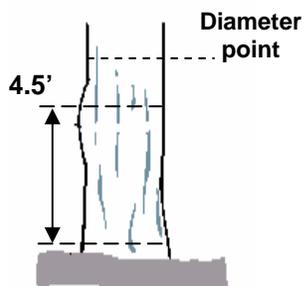
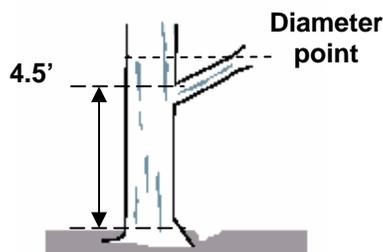


Figure 25. Bottleneck tree.

4. Tree with irregularities at DBH: On trees with swellings (Figure 26), bumps, depressions, and branches (Figure 27) at DBH, diameter will be measured immediately above the irregularity at the place it ceases to affect normal stem form.

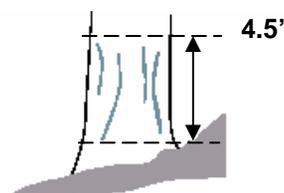


**Figure 26. Tree with swelling.**



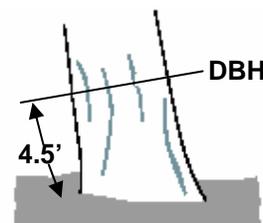
**Figure 27. Tree with branch.**

5. Tree on slope: Measure diameter at 4.5 feet from the ground along the bole on the uphill side of the tree (Figure 28).



**Figure 28. Tree on a slope.**

6. Leaning tree: Measure diameter at 4.5 feet from the ground along the bole. The 4.5-foot distance is measured along the underside face of the bole (Figure 29).

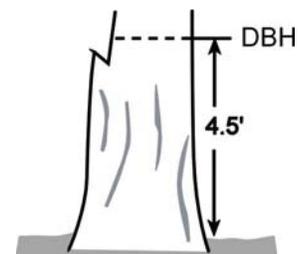


**Figure 29. Leaning tree.**

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

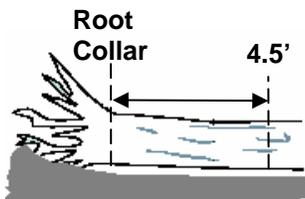
8. Independent trees that grow together: If two or more independent stems have grown together at or above the point of DBH, continue to treat them as separate trees. Estimate the diameter of each, set the "DIAMETER CHECK" code to 1, and explain the situation in the notes.

9. Missing wood or bark: Do not reconstruct the DBH of a tree that is missing wood or bark or at the point of measurement. Record the diameter, to the nearest 0.1 inch, of the wood and bark that is still attached to the tree (Figure 30). If a tree has a localized abnormality (gouge, depression, etc.) at the point of point of DBH, apply the procedure described for trees with irregularities at DBH (Figure 26 and 27).



**Figure 30. Tree with part of stem missing.**

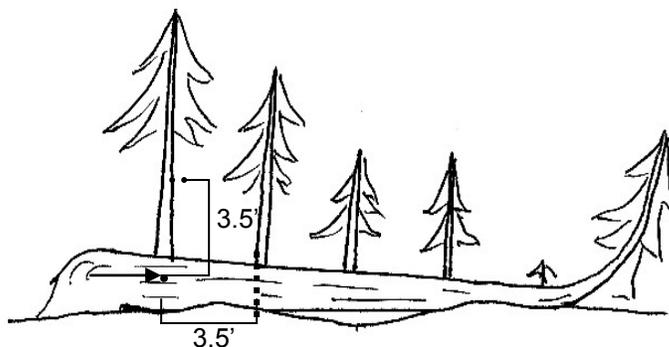
10. Live windthrown tree: Measure from the top of the root collar along the length to 4.5 feet (Figure 31).



**Figure 31. Tree on the ground.**

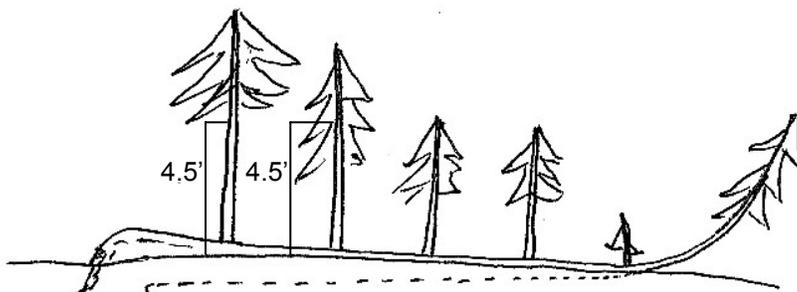
11. Down live tree with tree-form branches growing vertical from main bole: When a down live tree, touching the ground, has vertical (less than 45 degrees from vertical) tree-like branches coming off the main bole, first determine whether or not the pith of the main bole (averaged along the first log of the tree) is above or below the duff layer.

- If the pith of the main bole is above the duff layer, use the same forking rules specified for a forked tree, and take all measurements accordingly (Figure 32).
- If the pith intersection of the main down bole and vertical tree-like branch occurs below 4.5 feet from the stump along the main bole, treat that branch as a separate tree, and measure DBH 3.5 feet above the pith intersection for both the main bole and the tree-like branch.



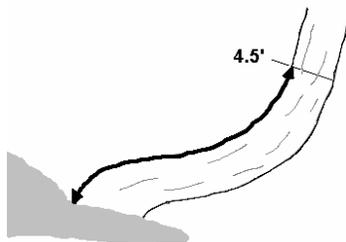
**Figure 32. Down tree above duff.**

- If the intersection between the main down bole and the tree-like branch occurs beyond the 4.5 feet point from the stump along the main bole, treat that branch as part of the main down bole.
- If the pith of main tree bole is below the duff layer, ignore the main bole, and treat each tree-like branch as a separate tree; take DBH and length measurements from the ground, not necessarily from the top of the down bole (Figure 33). However, if the top of the main tree bole curves out of the ground towards a vertical angle, treat that portion of that top as an individual tree originating where the pith leaves the duff layer.



**Figure 33. Down tree below duff.**

12. Tree with curved bole (pistol butt tree): Measure along the bole on the uphill side (upper surface) of the tree (Figure 34).



**Figure 34. Tree with curved bole (pistol butt tree).**

5.9.3 PREVIOUS DIAMETER AT ROOT COLLAR

This is the DRC assigned at the previous survey. It has been downloaded from the previous inventory. Any change made to this field signifies a misclassification at the time of the previous inventory. “DIAMETER CHECK” should be set to 2 and an explanation is required in the notes if previous DRC is changed.

5.9.4 DIAMETER AT ROOT COLLAR (DRC)

For species requiring diameter at the root collar (refer to Appendix 3), measure the diameter at the ground line or at the stem root collar, whichever is higher. For these trees, treat clumps of stems having a unified crown and common root stock as a single tree; examples include mesquite, juniper, and mountain mahogany. Treat stems of woodland species such as Gambel oak and bigtooth maple as individual trees if they originate below the ground. For woodland trees, record DRC STEM DIAMETER and DRC STEM STATUS (described below). Then compute and record the DRC value from the individual stem diameter information.

Measuring woodland stem diameters: Before measuring DRC, remove the loose material on the ground (e.g., litter) but not mineral soil. Measure just above any swells present, and in a location so that the diameter measurements are a good representation of the volume in the stems (especially when trees are extremely deformed at the base). Stems must be at least 1 foot in length and at least 1.0 inch in diameter 1 foot up from the stem diameter measurement point to qualify for measurement. Whenever DRC is impossible or extremely difficult to measure with a diameter tape (e.g., due to thorns, extreme number of limbs), stems may be estimated and recorded to the nearest 1.0-inch class. Additional instructions for DRC measurements are illustrated in Figure 35. For each qualifying stem of the woodland tree, measure and record DRC STEM DIAMETER (5.9.4.1) and indicate the DRC STEM STATUS (5.9.4.2).

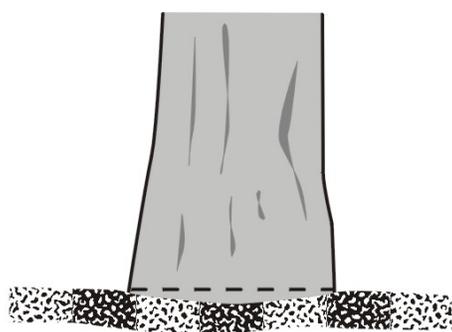
Computing and Recording DRC: For all tally trees requiring DRC, with at least one stem 1 foot in length and at least 1.0 inch in diameter 1 foot up from the stem diameter measurement point, DRC is computed as the square root of the sum of the squared stem diameters. For a single-stemmed DRC tree, the computed DRC is equal to the single diameter measured.

Use the following formula to compute DRC:

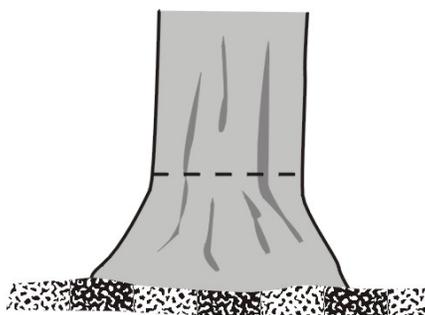
$$DRC = \sqrt{\sum(\text{stem diameter}^2)}$$

Round the result to the nearest 0.1 inch. For example, a multi-stemmed woodland tree with stems of 12.2, 13.2, 3.8, and 22.1 would be calculated as:

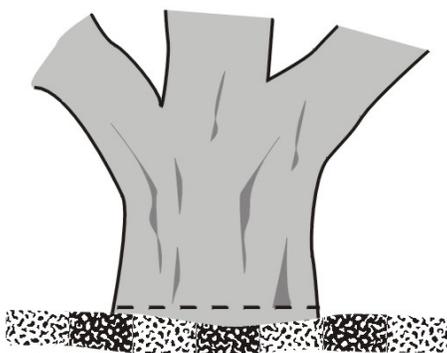
$$\begin{aligned} DRC &= \sqrt{12.2^2 + 13.2^2 + 3.8^2 + 22.1^2} \\ &= \sqrt{825.93} \\ &= 28.74 \\ &= 28.7 \end{aligned}$$



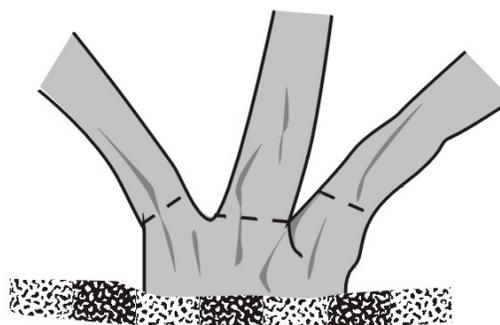
1. Measure at ground line when reasonable.



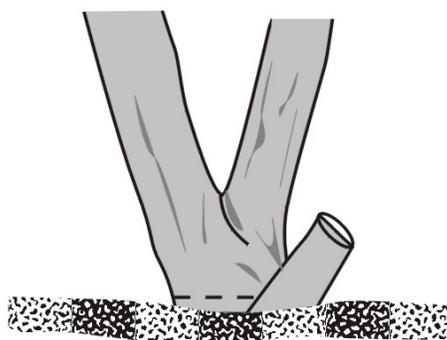
2. Measure above root collar.



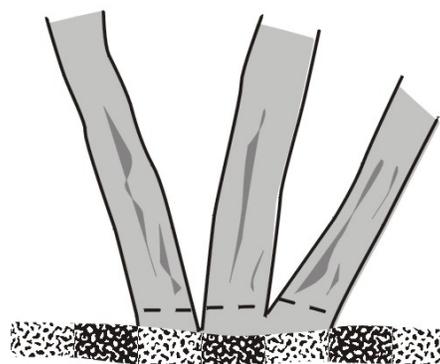
3. Multitemmed above diameter.



4. Excessive diameter below stems. Measure stems. Compute DRC.



5. Ignore cut/missing stem(s). Compute DRC.



6. Multitemmed at or below ground. Compute DRC.

Figure 35. How to measure DRC in a variety of situations.

#### 5.9.4.1 DRC STEM DIAMETER

Record the diameter of each individual qualifying stem on the woodland tree.

When collected: All stems on woodland tree species that are at least 1 ft in length and at least 1.0 in in diameter 1 ft up from the stem diameter measurement point

Field width: 4 digits (xxx.y)

Tolerance: +/- 0.2 in per stem

MQO: At least 95% of the time

Values: 001.0 to 999.9

#### 5.9.4.2 DRC STEM STATUS

Record the status of each individual stem on the woodland tally tree.

When collected: All stems on woodland tree species that are at least 1 ft in length and at least 1.0 in in diameter 1 ft up from the stem diameter measurement point

Field width: 1 digit

Tolerance: No errors

MQO: At least 95% of the time

Values:

- 1 live stem
- 2 dead stem

#### 5.10 PAST NUMBER OF STEMS

If the PAST NUMBER OF STEMS does not equal the CURRENT NUMBER OF STEMS, **do not** change the preprinted value. Make a note in TREE NOTES suggesting the possible reason for the difference.

When collected: Value is preprinted for SAMPLE KIND = 2 locations

Field width: 2 digits

Tolerance: No errors

MQO: At least 90% of the time

Values: 1 to 99

#### 5.11 CURRENT NUMBER OF STEMS

Record the total number of stems that were measured for DRC (e.g., record 1 stem as 01; record 12 stems as 12). Count only the number of qualifying stems used to calculate DRC. Qualifying stems are those that are at least 1.0 foot in length and at least 1.0 inch in diameter, 1 foot up from the measurement point.

When collected: For tallied **woodland** species with at least one stem 1.0 in in diameter or larger; includes woodland species tallied on the microplot

Field width: 2 digits

Tolerance: No errors

MQO: At least 90% of the time

Values: 1 to 99

#### 5.12 DIAMETER CHECK

Record this code to identify any irregularities in diameter measurement positions (e.g., abnormal swellings, diseases, damage, new measurement positions, etc.) that may affect use of this tree in diameter growth/change analyses.

When Collected: All live tally trees  $\geq 1.0$  in DBH/DRC and standing dead tally trees  $\geq 5.0$  in DBH/DRC

Field width: 1 digit

Tolerance: No errors

MQO: At least 99% of the time

Values:

- 0 Diameter measured accurately.
- 1 Diameter estimated.
- 2 Diameter measured at different location than previous measurement (remeasurement trees only).

Note: If both codes 1 and 2 apply, use code 2.

5.13 ROTTEN/MISSING CULL

Record the percent rotten or missing cubic-foot cull for all live tally trees greater than or equal to 5.0 inches DBH/DRC (CORE), mortality trees with a PREVIOUS DIAMETER  $\geq$  5.0 inches, and all new standing dead tally trees greater than or equal to 5.0 inches DBH/DRC (CORE OPTIONAL) when RECONCILE = 1 - 3.

Record the percentage of rotten and missing cubic-foot volume, to the nearest 1 percent. When estimating volume loss (tree cull), only consider the cull on the merchantable bole/portion of the tree, from a 1-foot stump to a 4-inch top. Do not include any cull estimate above ACTUAL LENGTH. For woodland species, the merchantable portion is between the point of DRC measurement to a 1.5-inch DOB top.

For mortality trees with a PREVIOUS DIAMETER  $\geq$  5.0 inches that are NOT at least 5 feet in length or have  $\geq$  50% ROTTEN/MISSING CULL, then record ROTTEN/MISSING CULL = 99.

Rotten and missing volume loss is often difficult to estimate. Refer to supplemental disease and insect pests field guides and local defect guidelines as an aid in identifying damaging agents and their impact on volume loss. Use your best judgment and be alert to such defect indicators as the following:

- Cankers or fruiting bodies.
- Swollen or punky knots.
- Dull, hollow sound of bole (use regional standards).
- Large dead limbs, especially those with frayed ends.
- Sawdust around the base of the tree.
- Metal imbedded in the wood.
- Metal in tree (e.g., sign, deer stands, fences, etc.).

Cull portions of the tree that contain embedded metal objects (e.g., fencing, nails) and sections between metal objects that are less than 4 feet in length, from the stump to the 4-inch top. Embedded aluminum is okay.

When Collected: All live tally trees  $\geq$  5.0 in DBH; all mortality trees with a PREVIOUS DIAMETER  $\geq$  5.0 inches; and all PRESENT TREE STATUS = 2 with RECONCILE = 1 - 3

Field width: 2 digits

Tolerance: +/- 10 %

MQO: At least 90% of the time

Values: 00 to 99

5.14 TOTAL LENGTH

Record the TOTAL LENGTH of the tree, to the nearest 1.0 foot from ground level to the top of the tree. For trees growing on a slope, measure on the uphill side of the tree. If the tree has a missing top (top is broken and completely detached from the tree), estimate what the total length would be if there were no missing top. Forked trees should be treated the same as unforked trees.

When Collected: All live tally trees  $\geq$  1.0 in DBH/DRC and all standing dead tally trees  $\geq$  5.0 in DBH/DRC with an intact top

Field width: 3 digits

Tolerance: +/- 10 % of true length

MQO: At least 90% of the time

Values: 005 to 400

5.15 ACTUAL LENGTH

Record for trees with missing tops (top on live trees is completely detached; top on dead trees is greater than 50 percent detached from the tree). If the top is intact, this item may be omitted. Record the ACTUAL LENGTH of the tree to the nearest 1.0 foot from ground level to the break. Use the length to the break for ACTUAL LENGTH until a new leader qualifies as the new top for TOTAL LENGTH; until that occurs, continue to record ACTUAL LENGTH to the break. Trees with previously broken tops are considered recovered (i.e., ACTUAL LENGTH = TOTAL LENGTH) when a new leader (dead or alive) is 1/3 the diameter of the broken top at the point where the top was broken (not

where the new leader originates from the trunk). Forked trees should be treated the same as unforked trees.

When Collected: All live tally trees (with broken or missing tops)  $\geq 1.0$  in DBH/DRC and standing dead tally trees (with broken or missing tops)  $\geq 5.0$  in DBH/DRC

Field width: 3 digits

Tolerance: +/- 10 % of true length

MQO: At least 90% of the time

Values: 005 to 400

#### 5.16 LENGTH METHOD

Record the code that indicates the method used to determine tree lengths.

When Collected: All live tally trees  $\geq 1.0$  in DBH/DRC and all standing dead tally trees  $\geq 5.0$  in DBH/DRC when TOTAL and/or ACTUAL LENGTHS are  $>0$ .

Field width: 1 digit

Tolerance: No errors

MQO: At least 99% of the time

Values:

- 1 Total and actual lengths are field measured with a measurement instrument (e.g., clinometer, relascope, tape).
- 2 Total length is visually estimated, actual length is measured with an instrument.
- 3 Total and actual lengths are visually estimated.

#### 5.17 CROWN CLASS

Rate tree crowns in relation to the sunlight received and proximity to neighboring trees (Figure 36). Base the assessment on the position of the crown at the time of observation. Example: a formerly overtopped tree which is now dominant due to tree removal is classified as dominant.

When Collected: All live tally trees  $\geq 1.0$  in DBH/DRC

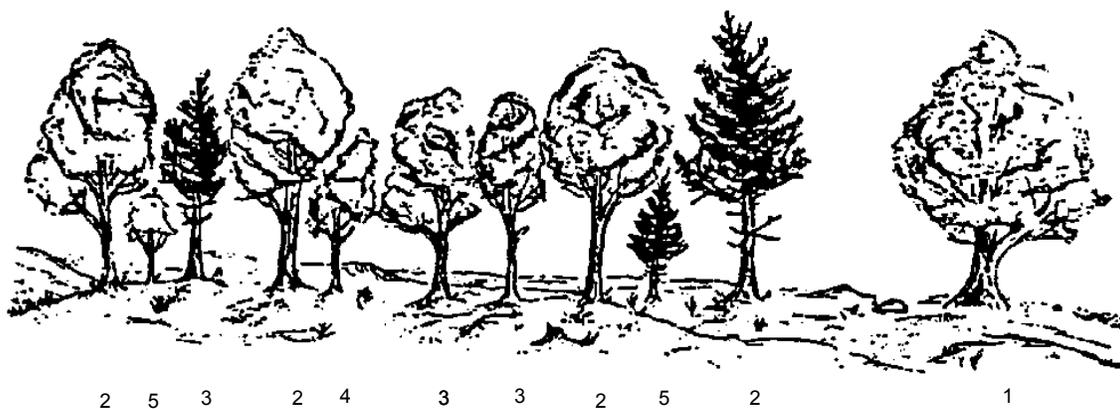
Field width: 1 digit

Tolerance: No errors

MQO: At least 85% of the time

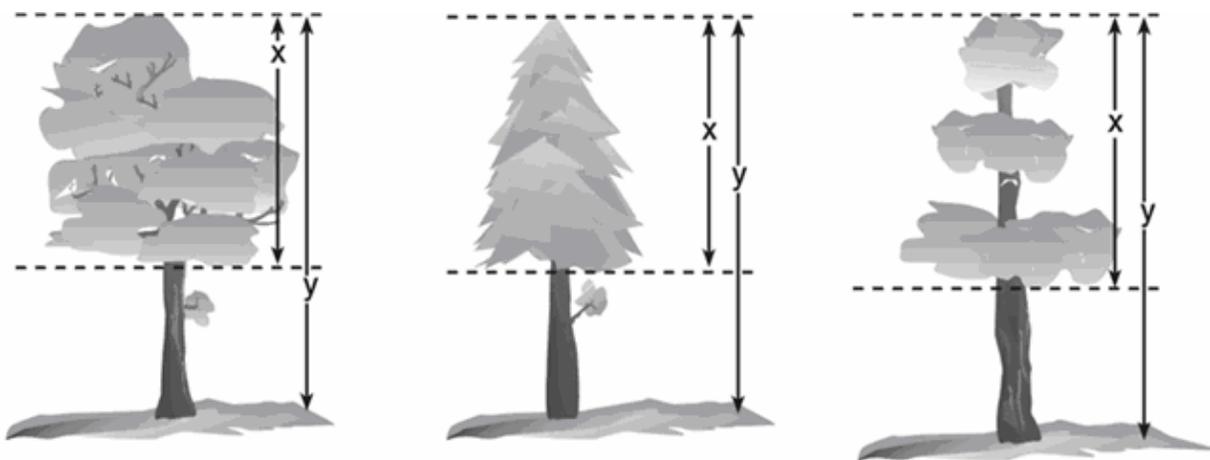
Values:

- 1 Open Grown – trees with crowns that received full light from above and from all sides throughout most of its life, particularly during its early developmental period.
- 2 Dominant – trees with crown extending above the general level of the crown canopy and receiving full light from above and partly from the sides. These trees are taller than the average trees in the stand and their crowns are well developed, but they could be somewhat crowded on the sides. Also, trees whose crowns have received full light from above and from all sides during early development and most of their life. Their crown form or shape appears to be free of influence from neighboring trees.
- 3 Co-dominant – trees with crowns at the general level of the crown canopy. Crowns receive full light from above but little direct sunlight penetrates their sides. Usually they have medium-sized crowns and are somewhat crowded from the sides. In stagnated stands, co-dominant trees have small-sized crowns and are crowded on the sides.
- 4 Intermediate – trees that are shorter than dominants and co-dominant, but their crowns extend into the canopy of co-dominant and dominant trees. They receive little direct light from above and none from the sides. As a result, intermediate trees usually have small crowns and are very crowded from the sides.
- 5 Overtopped – trees with crowns entirely below the general level of the crown canopy that receive no direct sunlight either from above or the sides.

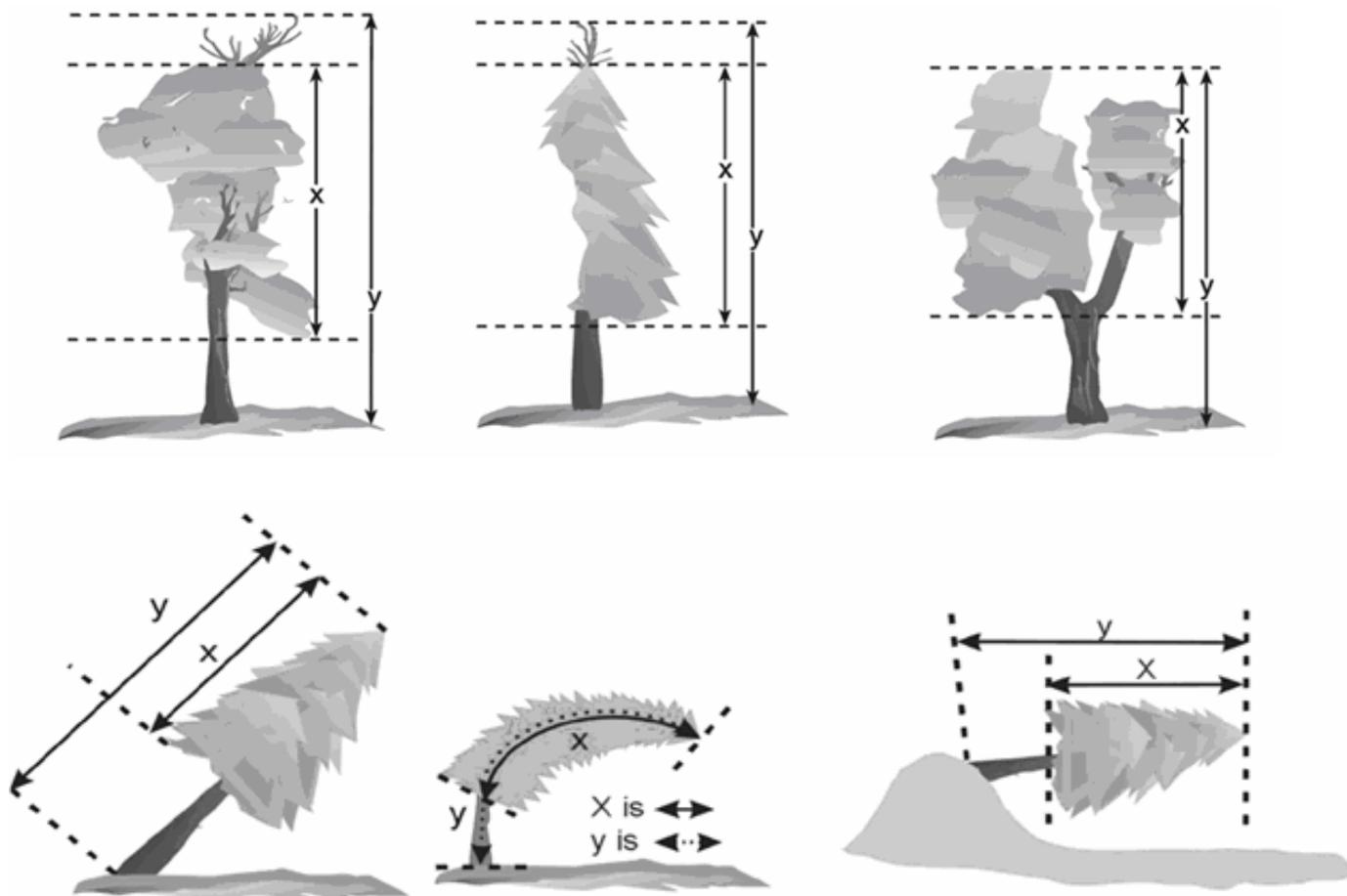


**Figure 36. Examples of CROWN CLASS code definitions (numbers are the CROWN CLASS codes).**

- 5.18 UNCOMPACTED LIVE CROWN RATIO (Phase 2 – CORE OPTIONAL, Phase 3 – CORE)  
 Record the UNCOMPACTED LIVE CROWN RATIO to the nearest one percent. UNCOMPACTED LIVE CROWN RATIO is the percentage of actual tree length supporting live foliage (or in cases of extreme defoliation should be supporting live foliage) that is effectively contributing to tree growth. UNCOMPACTED LIVE CROWN RATIO is determined by the ratio of live crown length to actual tree length (Figure 37). Live crown length is determined from the last live foliage at the crown top (dieback in the upper portion of the crown is not part of the live crown) to the “base of live crown”. Many times there are additional live branches below the “base of live crown”. These branches are only included if they have a basal diameter greater than 1 inch and are within 5 feet of the base of the obvious live crown. The live crown base becomes that point on the main bole perpendicular to the lowest live foliage on the last branch that is included in the live crown. The live crown base is determined by the live foliage and not by the point where a branch intersects with the main bole.



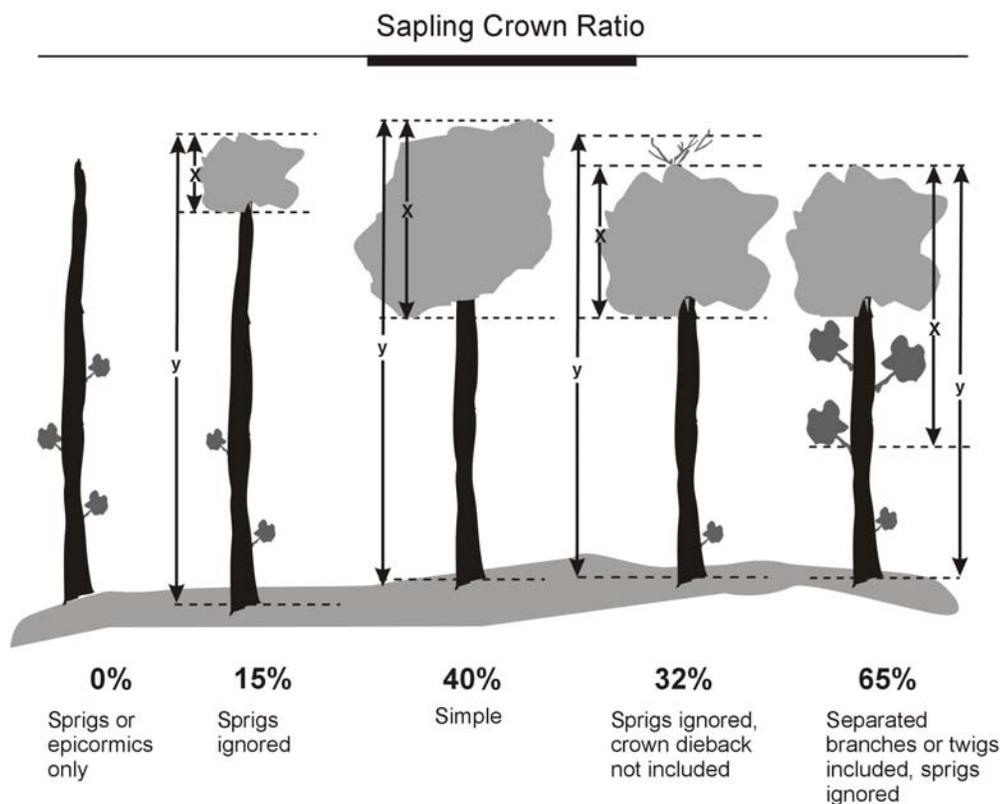
**Figure 37a. UNCOMPACTED LIVE CROWN RATIO examples.**



**Figure 37b. UNCOMPACTED LIVE CROWN RATIO examples.**

Determine sapling UNCOMPACTED LIVE CROWN RATIO by dividing the live crown length by actual tree length. Live crown length is the distance between the top live foliage (dieback and dead branches are not included) and the lowest live twig for saplings. The live crown base for saplings is different from trees 5.0 inches DBH/DRC and larger; the 1-inch/5-foot rule does not apply in this case. Do not include sprigs or leaves on the main stem below the lowest live twig (Figure 38).

When collected: Phase 3 CORE: All live tally trees  $\geq 1.0$  in DBH/DRC  
 Field width: 2 digits  
 Tolerance: +/- 10%  
 MQO: At least 90% of the time  
 Values: 00 to 99 percent



**Figure 38. Sapling ratio determination examples.**

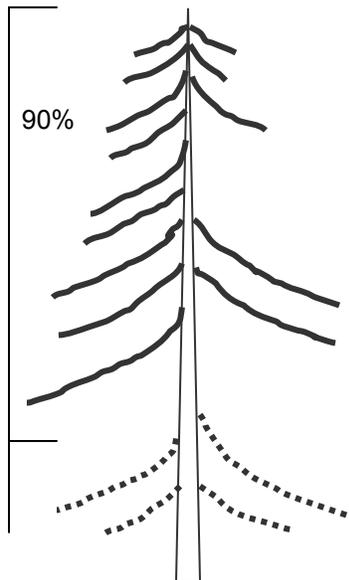
**5.19 COMPACTED CROWN RATIO**

Record the COMPACTED CROWN RATIO for each live tally tree, 1.0 inch and larger, to the nearest one percent. COMPACTED CROWN RATIO is that portion of the tree supporting live foliage (or in the case of extreme defoliation should be supporting live foliage) and is expressed as a percentage of the actual tree length. To determine COMPACTED CROWN RATIO, ocularly transfer lower live branches to fill in large holes in the upper portion of the tree until a full, even crown is visualized.

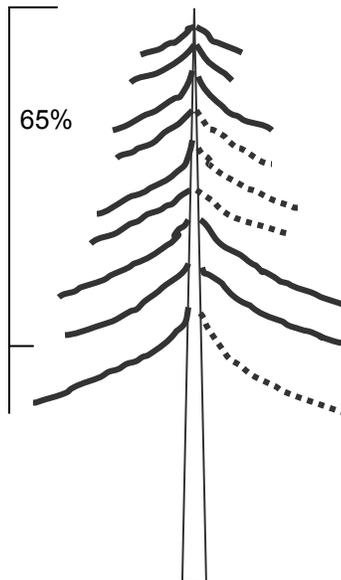
Do not over-compact trees beyond their typical full crown situation. For example, if tree branches tend to average 2 feet between whorls, do not compact crowns any tighter than the 2-foot spacing (Figure 39). Figure 40 shows an example of COMPACTED CROWN RATIO on a leaning tree.

Open-crown conifer (e.g., ponderosa pine) –

Uncompacted:

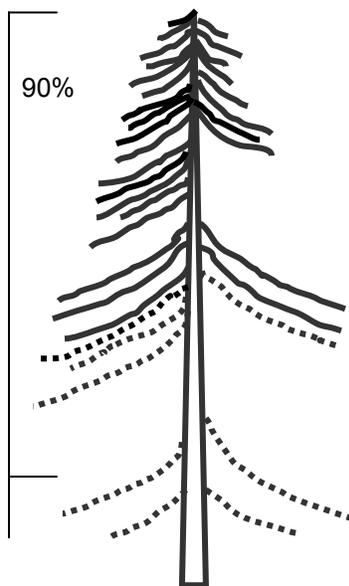


Compacted:

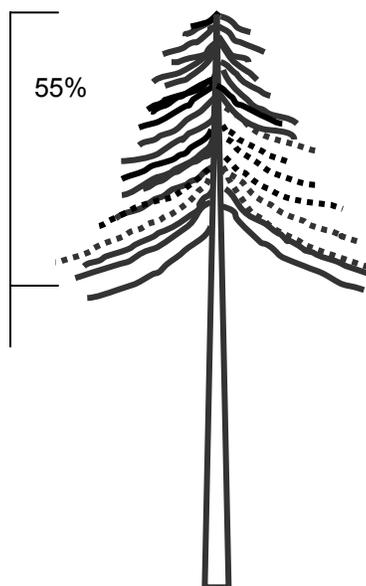


Dense-crown conifer (e.g., subalpine fir) –

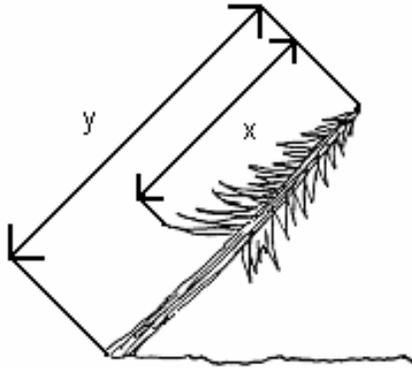
Uncompacted:



Compacted:



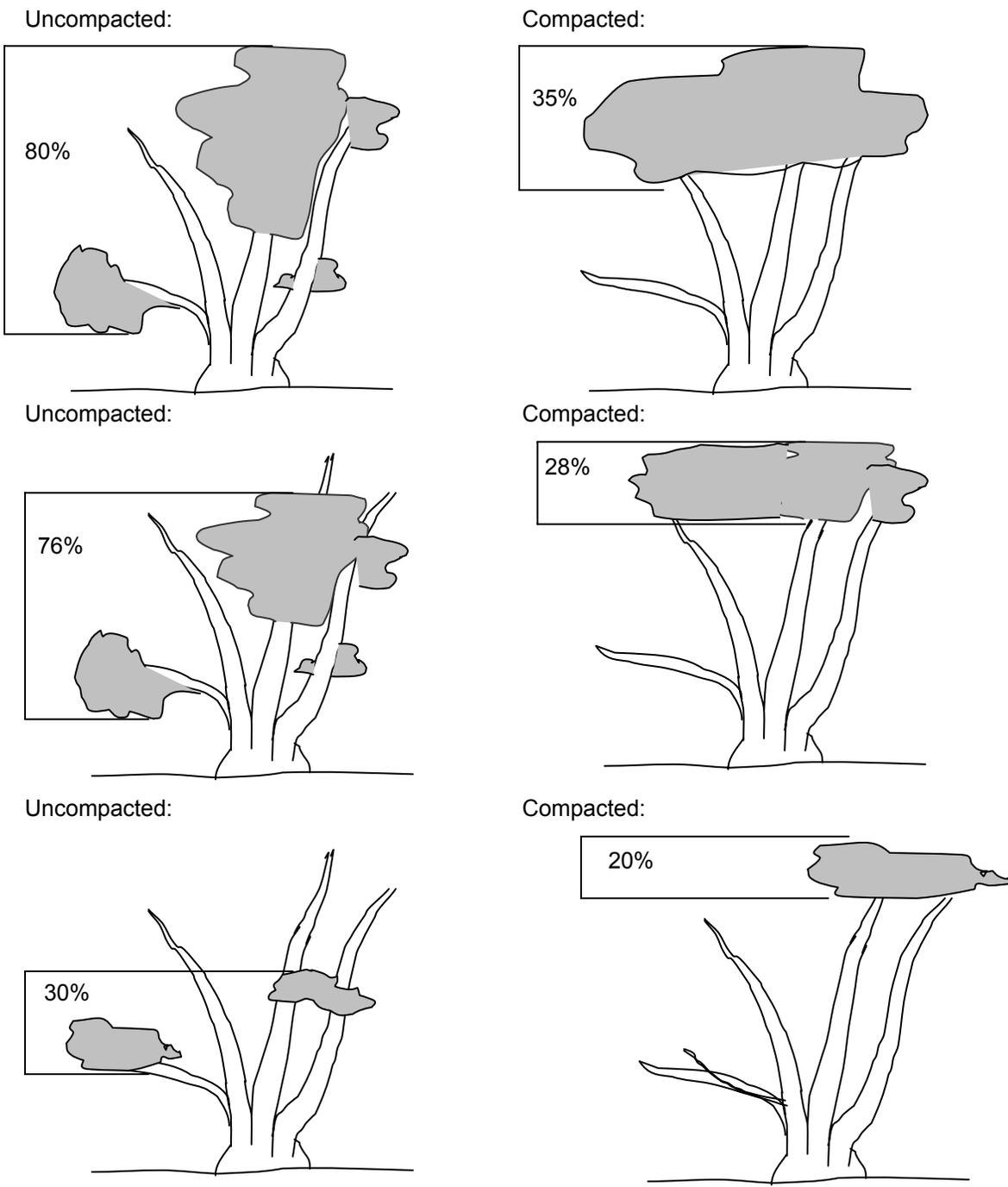
**Figure 39. Examples of and comparison between COMPACTED CROWN RATIO and UNCOMPACTED LIVE CROWN RATIO of conifers.**



**Figure 40. COMPACTED CROWN RATIO on a leaning tree. CROWN RATIO =  $(x/y)100$ .**

For multi-stemmed woodland species, ocularly transfer lower live foliage to fill large holes on all stems and form an even crown across the tree (Figure 41).

When Collected: All live tally trees  $\geq 1.0$  in DBH/DRC  
Field width: 2 digits  
Tolerance: +/- 10 %  
MQO: At least 80% of the time  
Values: 00 to 99



**Figure 41. Examples of and comparison between COMPACTED CROWN RATIO and UNCOMPACTED LIVE CROWN RATIO of woodland species.**

- 5.20 Tree Damage (for more information, see National Core Field Guide, version 4.0)
- 5.20.1 DAMAGE LOCATION 1 (CORE OPTIONAL)
- 5.20.2 DAMAGE TYPE 1 (CORE OPTIONAL)
- 5.20.3 DAMAGE SEVERITY 1 (CORE OPTIONAL)
- 5.20.4 DAMAGE LOCATION 2 (CORE OPTIONAL)
- 5.20.5 DAMAGE TYPE 2 (CORE OPTIONAL)
- 5.20.6 DAMAGE SEVERITY 2 (CORE OPTIONAL)

5.21 CAUSE OF DEATH

Record a cause of death for all trees that have died or been cut since the previous survey. If cause of death cannot be reliably estimated, record unknown/not sure/other.

When Collected: CORE: SAMPLE KIND = 2 plots: all PREVIOUS TREE STATUS = 1 and PRESENT TREE STATUS = 2 or 3; or PRESENT TREE STATUS = 2 and RECONCILE = 1, 2, or 3

Field width: 2 digits

Tolerance: No errors

MQO: At least 80% of the time

Values:

- 10 Insect
- 20 Disease
- 30 Fire
- 40 Animal
- 50 Weather
- 60 Vegetation (suppression, competition, vines/kudzu)
- 70 Unknown/not sure/other - includes death from human activity not related to silvicultural or landclearing activity (accidental, random, etc.). TREE NOTES required.
- 80 Silvicultural or landclearing activity (death caused by harvesting or other silvicultural activity, including girdling, chaining, etc., or to landclearing activity)

5.22 MORTALITY YEAR (CORE OPTIONAL)

Record the estimated year that remeasured trees died or were cut. For each remeasured tree that has died or been cut since the previous inventory, record the 4-digit year in which the tree died. Mortality year is also recorded for trees on land that has been converted to a nonforest land use, if it can be determined that a tree died before the land was converted. Record the year the tree was converted to a nonforest land use or the year the tree was cut or died, whichever came first.

When Collected: Plots where SAMPLE KIND = 2: all PREVIOUS TREE STATUS = 1 and PRESENT TREE STATUS = 2 or 3; or PRESENT TREE STATUS = 2 and RECONCILE = 1, 2, or 3.

Field width: 4 digits

Tolerance: +/- 1 year for remeasurement cycles of 5 years

+/- 2 years for remeasurement cycles of > 5 years

MQO: At least 70% of the time

Values: 1994 or higher

5.23 DECAY CLASS

Record for each standing dead tally tree, 5.0 inches in diameter and larger, the code indicating the tree's stage of decay.

When Collected: All standing dead tally trees  $\geq 5.0$  in DBH/DRC

Field width: 1 digit

Tolerance: +/- 1 class

MQO: At least 90% of the time

Values: Use the following table for guidelines (see next page):

Decay class stage (code)	Limbs and branches	Top	% Bark Remaining	Sapwood presence and condition *	Heartwood condition *
1	All present	Pointed	100	Intact; sound, incipient decay, hard, original color	Sound, hard, original color
2	Few limbs, no fine branches	May be broken	Variable	Sloughing; advanced decay, fibrous, firm to soft, light brown	Sound at base, incipient decay in outer edge of upper bole, hard, light to reddish brown
3	Limb stubs only	Broken	Variable	Sloughing; fibrous, soft, light to reddish brown	Incipient decay at base, advanced decay throughout upper bole, fibrous, hard to firm, reddish brown
4	Few or no stubs	Broken	Variable	Sloughing; cubical, soft, reddish to dark brown	Advanced decay at base, sloughing from upper bole, fibrous to cubical, soft, dark reddish brown
5	None	Broken	Less than 20	Gone	Sloughing, cubical, soft, dark brown, OR fibrous, very soft, dark reddish brown, encased in hardened shell

\* Characteristics are for Douglas-fir. Dead trees of other species may vary somewhat. Use this only as a guide.

#### 5.24 LENGTH TO DIAMETER MEASUREMENT POINT (CORE OPTIONAL)

Record this item when tree diameter measurement locations are not monumented. For those trees measured directly at 4.5 feet above the ground, leave this item blank. If the diameter is not measured at 4.5 feet, record the actual length from the ground, to the nearest 0.1 foot, at which the diameter was measured for each tally tree, 1.0 inch DBH and larger. Leave this item blank for woodland species measured for diameter at root collar.

When Collected: All live and dead tally trees (except woodland species)  $\geq 1.0$  in DBH when PRESENT DIAMETER > 0

Field width: 3 digits  
Tolerance: +/- 0.2 ft  
MQO: At least 90% of the time  
Values: 00.1 – 15.0

#### 5.25 ROUGH CULL (CORE OPTIONAL)

For each live tally tree 5.0 inches DBH/DRC and larger, record the total percentage of cubic-foot volume that is cull due to sound dead material or tree form. Record to the nearest 1 percent. When estimating volume loss (tree cull), only consider the cull on the merchantable bole/portion of the tree, from a 1-foot stump to a 4-inch top.

For woodland species, the merchantable portion is between the point of DRC measurement to a 1.5-inch DOB top, and rough cull includes only sound dead.

Refer to local defect guidelines as an aid in determining cull volume for various damages such as crook, fork, sweep, pistol butt, etc. Small trees (5-9 inches for softwoods and 5-11 inches for hardwoods) that have poor form and are not expected to ever produce merchantable material should be coded 99% rough cull.

When Collected: CORE OPTIONAL: All live tally trees  $\geq 5.0$  in DBH/DRC  
Field width: 2 digits  
Tolerance: +/- 10%  
MQO: At least 90% of the time  
Values: 00 to 99

5.26 DWARF MISTLETOE CLASS (CORE OPTIONAL)

Rate all live conifer species, except juniper species, greater than or equal to 1.0 inch diameter for dwarf mistletoe (*Arceuthobium* spp.) infection. Use the Hawksworth six-class rating system: divide the live crown into thirds, and rate each third using the following scale:

- 0 No visible infection
- 1 Light infection -- < 50 percent of the total branches infected
- 2 Heavy infection -- > 50 percent of the total branches infected

Sum the three individual ratings to obtain and record a total mistletoe class (0 to 6) for the tree.

When Collected: CORE OPTIONAL: All live conifer (except juniper) tally trees  $\geq$  1.0 in DBH/DRC  
 Field width: 1 digit  
 Tolerance: +/- 1 class  
 MQO: At least 90% of the time  
 Values: 0 to 6

5.27 TREE NOTES

Record notes pertaining to an individual tree as called for to explain or describe another variable.

When collected: All trees  
 Field width: Alphanumeric character field  
 Tolerance: N/A  
 MQO: N/A  
 Values: English language words, phrases and numbers

5.28 SRS TREE CLASS

Record the code that indicates the tree class. All palm species are coded TREE CLASS = 3.

When collected: All live tally trees > 5.0 in DBH and all TREE STATUS = 2 and RECONCILE = 1-3.  
 Field width: 1 digit  
 MQO: at least 90% of the time  
 Tolerance: no errors

Values: 2 – 4

- 2 Growing stock — Trees with one-third or more of the gross board foot volume in the entire sawlog section with commercial logs meeting grade, soundness, and size requirements or the potential to do so for poletimber-sized trees. A tree class 2 tree must have one 12-foot log or two 8-foot logs, now or prospectively, for live poletimber-sized trees to qualify as growing stock.
- 3 Rough cull — Trees that do not contain at least one 12-foot sawlog or two 8-foot logs now or prospectively, primarily because of roughness or poor form. Less than 1/3 of its gross board-foot volume meets size, soundness, and grade requirements and less than 1/2 of the cubic-foot cull is rotten or unsound.
- 4 Rotten cull — Trees that do not contain at least one 12-foot sawlog or two 8-foot logs now or prospectively and/or do not meet grade specifications for percent sound primarily because of rot. All species not having 1/3 or more of its gross board-foot volume meeting size, soundness, and grade requirements, and over 1/2 of the cubic-foot cull is rotten or unsound.

5.29 SRS TREE GRADE

Record the code indicating the grade of the tree. See Appendix 5 for full description of procedures.

When collected: PRESENT TREE STATUS = 1 and TREE CLASS = 2; DBH > 11.0 in for hardwoods or DBH > 9.0 in for softwoods

Field width: 1 digit

Tolerance: No errors

MQO: At least 90% of the time

Values: 1 to 5

5.30 SRS PERCENT BOARD FOOT CULL

Record the percentage of sound and unsound board-foot volume, to the nearest 1 percent. See Appendix 5 for complete procedures and board foot volume tables.

When collected: PRESENT TREE STATUS = 1 and TREE CLASS = 2; DBH > 11.0 in for hardwoods or DBH > 9.0 in for softwoods

Field width: 2 digits

Tolerance: +/- 10%

MQO: At least 90% of the time

Values: 00-67

5.31 SRS DISEASE

Record the incidence of fusiform, comandra rust and dieback.

When collected: All live hardwoods and SPECIES = 110, 111, 121, 126, 128 or 131 on the four subplots when DBH is > 5.0

Field width: 1 digit

Tolerance: No errors

MQO: At least 80% of the time

Values: See next page

<u>Code</u>	<u>Agent</u>	<u>Description/Threshold</u>
0	None	
1	Fusiform, Comandra Rust	SPECIES 110, 111, 121, 126, 128 or 131 ONLY: Record only those cankers that occur on the main stem or on a live branch within 12 inches of the stem. Many older galls appear as cankers with sunken rotten centers encircled by callus ridges. Witch's broom is common at galls. Masses of yellow-orange spores in the spring on the galls and canker margins.
2	Dieback	HARDWOODS ONLY: Record if 10% or more of the crown area is affected. Do not code for overtopped trees. Branches dieback from the tips. Just a few branches are affected at first with whole branches dying in the advanced stages. Frequently associated with stress caused by unfavorable environment, especially drought.

5.32 SRS DIEBACK SEVERITY

Record the severity of hardwood crown dieback.

When collected: HARDWOOD Dieback Incidence = 2

Field width: 1 digit

Tolerance: +/- 1 class

MQO: At least 80% of the time

Values: 1 to 9

<u>Code</u>	<u>Class in percent</u>	<u>Code</u>	<u>Class in percent</u>	<u>Code</u>	<u>Class in percent</u>
1	10-19	4	40-49	7	70-79
2	20-29	5	50-59	8	80-89
3	30-39	6	60-69	9	90-99

**5.33 SRS UTILIZATION CLASS**

Record the code to identify the utilization class of utilized trees. The default code on PDR is 1.

When collected: PRESENT TREE STATUS = 3

Field width: 1 digits

Tolerance: No errors

MQO: At least 99% of the time

Values:

- 1 Commercial utilization – some portion of the tree removed for commercial purposes. Commercial uses include sawlogs, pulpwood, veneer logs, poles, and other products such as firewood cut by commercial firewood operations.
- 2 Non-commercial utilization – some portion of the tree removed for non-commercial purposes. Non-commercial uses include domestic firewood use, barn poles, fence posts, domestic landscaping, rough slabs, etc.

**5.34 SRS SPECIES CODE**

Record the appropriate SRS SPECIES code from the list below. SRS SPECIES should be recorded when SPECIES = 999. If the species is not on the list below, but is a tree species that should be recorded, enter SRS SPECIES code 99 and collect a sample for identification.

When collected: SPECIES CODE = 999

Field width: 2 digits

Tolerance: No errors

MQO: At least 99% of the time

Values:

- |    |                                   |
|----|-----------------------------------|
| 01 | Pyrus spp.                        |
| 02 | Pyrus communis (Common pear)      |
| 03 | Pyrus calleryana (Callery pear)   |
| 04 | Quercus acutissima (Sawtooth oak) |

**5.35 SRS ABNORMAL TERMINATION**

For all standing trees, record the code indicating whether the tree length was terminated early due to a broken top (top on live trees is completely detached; top on dead trees is greater than 50 percent detached from the tree).

When collected: All standing trees

Field width: 1 digit

Tolerance: No errors

MQO: At least 99% of the time

Values:

- |   |                                   |
|---|-----------------------------------|
| 0 | Stem is not abnormally terminated |
| 1 | Stem is abnormally terminated     |

## 6.0 SEEDLING DATA

Stocking and regeneration information are obtained by counting live seedlings within the 6.8-foot radius microplot located 90 degrees and 12.0 feet from each subplot center within each of the four subplots. Conifer seedlings must be at least 6.0 inches in length and less than 1.0 inch at DBH/DRC in order to qualify for tallying, except longleaf pine, which must be 0.5 inch at the root collar. Hardwood seedlings must be at least 12.0 inches in length and less than 1.0 inch at DBH/DRC in order to qualify for tallying. For woodland species, each stem on a single tree must be less than 1.0 inch in DRC. Seedlings are counted in groups by species and condition class, up to five individuals per species. Counts beyond five estimated. Only count seedlings occurring in accessible forest land condition classes.

### 6.1 SUBPLOT NUMBER

Use the same procedures described in Section 3.1.

When Collected: All counts of seedlings

### 6.2 SPECIES

Use the same procedures described in Section 5.8.

When Collected: All counts of seedlings

Field width: 4 digits

Tolerance: No errors for genus, no errors for species

MQO: At least 90% of the time for genus, at least 85% of the time for species

Values: See Appendix 3

### 6.3 CONDITION CLASS NUMBER

Use the same procedures described in Section 2.0.

When Collected: All counts of seedlings

### 6.4 SEEDLING COUNT

On each microplot, record the number of live tally tree seedlings, by species and condition class. Count up to five individuals by species: estimate the total count if there are more than five individuals of any given species in any given condition class. When seedlings are distributed evenly on a microplot, a suggested method of estimating is to count the number of seedlings on one quarter of the microplot and multiply by four (given that there is only one condition class on the microplot). Repeat for each species. Conifer seedlings must be at least 6.0 inches in length and less than 1.0 inch at DBH to qualify for counting, except longleaf pine, which must be 0.5 inch at the root collar. Hardwood seedlings must be at least 12.0 inches in length and less than 1.0 inch at DBH in order to qualify for counting.

For woodland species, each stem on a single tree must be less than 1.0 inch at DRC.

Multiple "suckers" that originate from the same location, and stump sprouts are considered one seedling. Do not tally or count "layers" (undetached branches partially or completely covered by soil, usually at the base) as seedlings. Do not tally any seedlings that sprout from a live tally tree.

When Collected: Each accessible forest land condition class on each microplot

Field width: 3 digits

Tolerance: No errors for 5 or less per species; +/- 20% over a count of 5

MQO: At least 90% of the time

Values: 001 through 999



## 7.0 SITE TREE INFORMATION

Site trees are a measure of site productivity expressed by the height to age relationship of dominant and co-dominant trees. If suitable site trees are available, site tree data are required for every accessible forest land condition class defined on a plot. An individual site tree may be used for more than one condition class where differences in condition classes are not the result of differences in site productivity. For example, when different condition classes are caused solely due to differences in reserved status, owner class, and/or disturbance-related differences in density (e.g., heavily thinned vs. unthinned), a site tree may be used for more than one condition class. When in doubt, do not use a site tree for more than one condition class.

### 7.1 SITE TREE SELECTION

Select at least one site tree for each accessible forest land condition class where no previous site tree data exist. The absence of site tree data may occur because:

- This is the first visit to the site
- On the previous visit no suitable site tree could be found for the condition
- Since the last visit there has been a change in condition class that renders the previous data incompatible with the current conditions

If a site tree is needed; select tree from a species common to the condition class being sampled, based on the criteria listed in Appendix 4. Select trees off the subplot where possible. Use only trees that have remained in a dominant or co-dominant crown position throughout their entire life span. If possible, trees should be 5.0 inches in diameter, or larger, and at least 20 years old. Trees that are visibly damaged, trees with ring patterns that exhibit signs of suppression, and trees with rotten cores should be rejected. If there are no acceptable site trees, record that in the plot notes and leave this section blank.

### 7.2 SITE TREE DATA VARIABLES

#### 7.2.1 CONDITION CLASS LIST

List all CONDITION CLASSES that the site index data from this tree represent.

When Collected: All site trees  
Field width: 4 digits  
Tolerance: No errors  
MQO: At least 99% of the time  
Values: 1000 to 9876

#### 7.2.2 SPECIES

Use the same procedures described in Section 5.8 (Appendix 4 lists preferred site tree species by region).

When Collected: All site trees  
Values: See Appendix 4

#### 7.2.3 DIAMETER

Use the same procedures described in Section 5.9.

When Collected: All site trees  
Field width: 4 digits (xxx.y)  
Tolerance: +/- 0.1 in per 20.0 in increment of measured diameter  
MQO: At least 95% of the time  
Values: 005.0 to 999.9

7.2.4 SITE TREE LENGTH

With a clinometer or other approved instrument, measure the total length of the site tree from the ground to the top of the tree. Record to the nearest 1.0 foot. SITE TREE LENGTH must be measured; no estimates are permitted on site trees.

When Collected: All site trees  
Field width: 3 digits  
Tolerance: +/- 10% of true length  
MQO: At least 90% of the time  
Values: 005 to 999

7.2.5 TREE AGE AT DIAMETER

Record the tree age as determined by an increment sample. Bore the tree at the point of diameter measurement (DBH) with an increment borer. Count the rings between the outside edge of the core and the pith. Do not add years to get total age.

When Collected: All site trees  
Field width: 3 digits  
Tolerance: +/- 5 years  
MQO: At least 95% of the time  
Values: 012 to 120 for softwoods; 013 to 120 for hardwoods, and 008 to 120 for longleaf pine

7.2.6 SITE TREE NOTES

Record notes pertaining to an individual site tree.

When collected: All site trees as necessary  
Field width: alphanumeric character field  
Tolerance: N/A  
MQO: N/A  
Values: English language words, phrases and numbers

7.2.7 SUBPLOT NUMBER (CORE OPTIONAL)

Record the subplot number to which the site tree is referenced.

When Collected: All site trees  
Field width: 1 digit  
Tolerance: No errors  
MQO: At least 99% of the time  
Values:

- 1 Center subplot
- 2 North subplot
- 3 Southeast subplot
- 4 Southwest subplot

7.2.8 AZIMUTH (CORE OPTIONAL)

Record the AZIMUTH from the subplot center; sight the center of the base of each tree with a compass. Record AZIMUTH to the nearest degree. Use 360 for north.

When Collected: All site trees  
Field width: 3 digits  
Tolerance: +/- 10 degrees  
MQO: At least 90% of the time  
Values: 001 to 360

7.2.9 HORIZONTAL DISTANCE (CORE OPTIONAL)

Record the measured HORIZONTAL DISTANCE, to the nearest 0.1 foot, from the subplot center to the pith of the tree at the base.

When Collected: All site trees

Field width: 4 digits (xxx.y)

Tolerance: +/- 5 ft

MQO: At least 90% of the time

Values: 0001 to 2000

7.2.10 SRS SITE CLASS

This item will be derived by the data recorder.

When collected: All site trees

Field width: 1 digit

Values: 1-7 (calculated by the data recorder)

Site class 1-6: ACCESSIBLE FORESTLAND

Site class 7: ACCESSIBLE OTHER FORESTLAND



## APPENDICES

1. State and County, Parish or Borough FIPS Codes

These are the standard federal 2- and 3-digit codes for States and Counties, Parishes, or Boroughs, respectively.

2. FIA Forest Type Codes

These are the codes that correspond to the National FIA forest typing algorithm. Definitions for the types will be included in a future draft. Units may choose to also add local forest type groupings.

3. FIA Tree Species Codes

This list includes all species deemed to be tally trees with woodland trees measured for DRC indicated.

4. Site Tree Selection Criteria and Species List

5. Determination of Stocking Values for Land Use Classification

6. Glossary

7. Tolerance / MQO / Value / Units Table

8. Tree Coding Guide

## Appendix 1. State and County, Parish, or Borough FIPS Codes

<b>(01) Alabama</b>	(045) Dale	(091) Marengo
(001) Autauga	(047) Dallas	(093) Marion
(003) Baldwin	(049) De Kalb	(095) Marshall
(005) Barbour	(051) Elmore	(097) Mobile
(007) Bibb	(053) Escambia	(099) Monroe
(009) Blount	(055) Etowah	(101) Montgomery
(011) Bullock	(057) Fayette	(103) Morgan
(013) Butler	(059) Franklin	(105) Perry
(015) Calhoun	(061) Geneva	(107) Pickens
(017) Chambers	(063) Greene	(109) Pike
(019) Cherokee	(065) Hale	(111) Randolph
(021) Chilton	(067) Henry	(113) Russell
(023) Choctaw	(069) Houston	(115) St Clair
(025) Clarke	(071) Jackson	(117) Shelby
(027) Clay	(073) Jefferson	(119) Sumter
(029) Cleburne	(075) Lamar	(121) Talladega
(031) Coffee	(077) Lauderdale	(123) Tallapoosa
(033) Colbert	(079) Lawrence	(125) Tuscaloosa
(035) Conecuh	(081) Lee	(127) Walker
(037) Coosa	(083) Limestone	(129) Washington
(039) Covington	(085) Lowndes	(131) Wilcox
(041) Crenshaw	(087) Macon	(133) Winston
(043) Cullman	(089) Madison	



**(05) Arkansas**

(001) Arkansas  
(003) Ashley  
(005) Baxter  
(007) Benton  
(009) Boone  
(011) Bradley  
(013) Calhoun  
(015) Carroll  
(017) Chicot  
(019) Clark  
(021) Clay  
(023) Cleburne  
(025) Cleveland  
(027) Columbia  
(029) Conway  
(031) Craighead  
(033) Crawford  
(035) Crittenden  
(037) Cross  
(039) Dallas  
(041) Desha  
(043) Drew  
(045) Faulkner  
(047) Franklin  
(049) Fulton

(051) Garland  
(053) Grant  
(055) Greene  
(057) Hempstead  
(059) Hot Spring  
(061) Howard  
(063) Independence  
(065) Izard  
(067) Jackson  
(069) Jefferson  
(071) Johnson  
(073) Lafayette  
(075) Lawrence  
(077) Lee  
(079) Lincoln  
(081) Little River  
(083) Logan  
(085) Lonoke  
(087) Madison  
(089) Marion  
(091) Miller  
(093) Mississippi  
(095) Monroe  
(097) Montgomery  
(099) Nevada  
(101) Newton

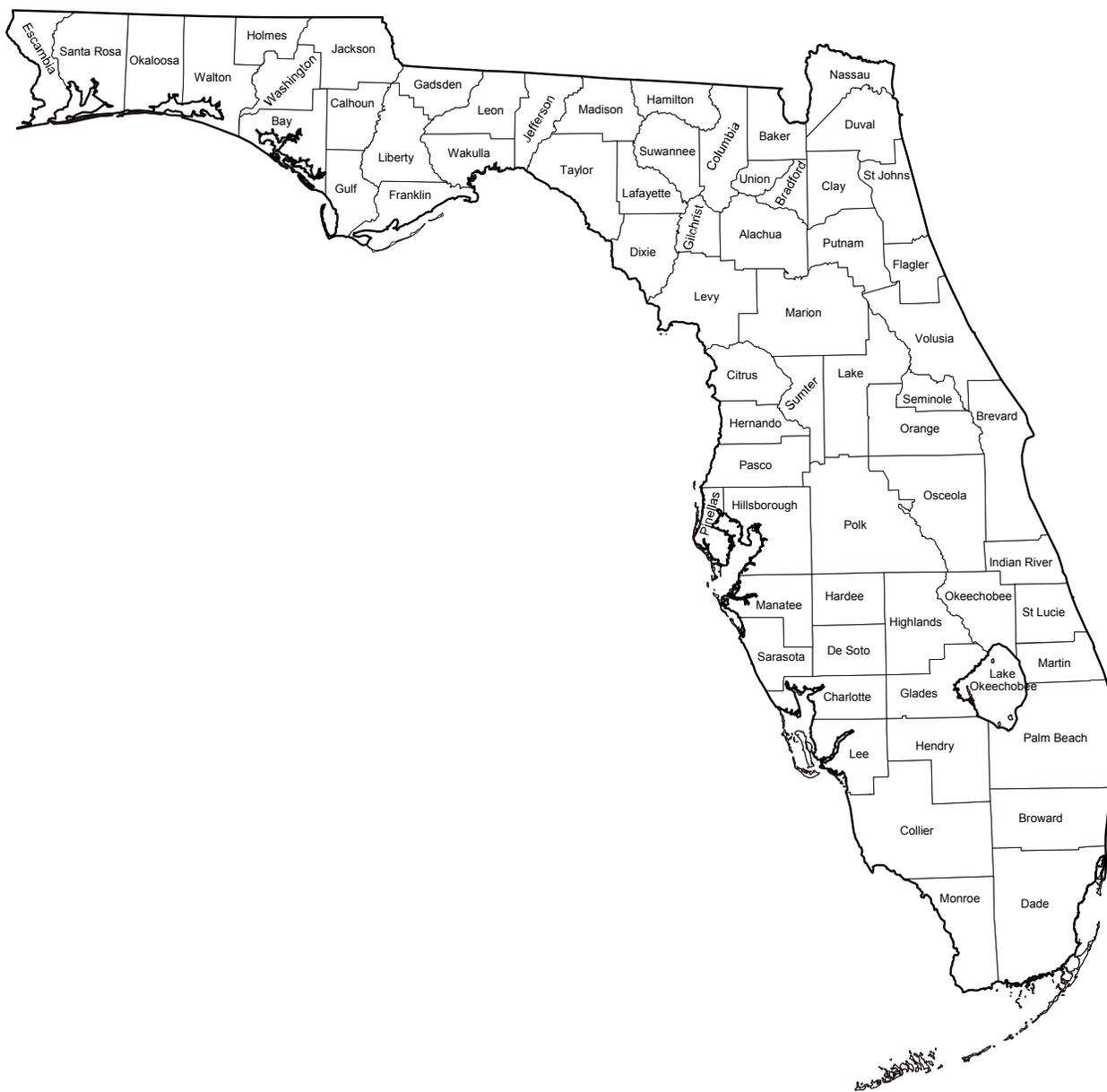
(103) Ouachita  
(105) Perry  
(107) Phillips  
(109) Pike  
(111) Poinsett  
(113) Polk  
(115) Pope  
(117) Prairie  
(119) Pulaski  
(121) Randolph  
(123) St. Francis  
(125) Saline  
(127) Scott  
(129) Searcy  
(131) Sebastian  
(133) Sevier  
(135) Sharp  
(137) Stone  
(139) Union  
(141) Van Buren  
(143) Washington  
(145) White  
(147) Woodruff  
(149) Yell



**(12) Florida**  
(001) Alachua  
(003) Baker  
(005) Bay  
(007) Bradford  
(009) Brevard  
(011) Broward  
(013) Calhoun  
(015) Charlotte  
(017) Citrus  
(019) Clay  
(021) Collier  
(023) Columbia  
(025) Dade  
(027) De Soto  
(029) Dixie  
(031) Duval  
(033) Escambia  
(035) Flagler  
(037) Franklin  
(039) Gadsden  
(041) Gilchrist  
(043) Glades

(045) Gulf  
(047) Hamilton  
(049) Hardee  
(051) Hendry  
(053) Hernando  
(055) Highlands  
(057) Hillsborough  
(059) Holmes  
(061) Indian River  
(063) Jackson  
(065) Jefferson  
(067) Lafayette  
(069) Lake  
(071) Lee  
(073) Leon  
(075) Levy  
(077) Liberty  
(079) Madison  
(081) Manatee  
(083) Marion  
(085) Martin  
(087) Monroe  
(089) Nassau

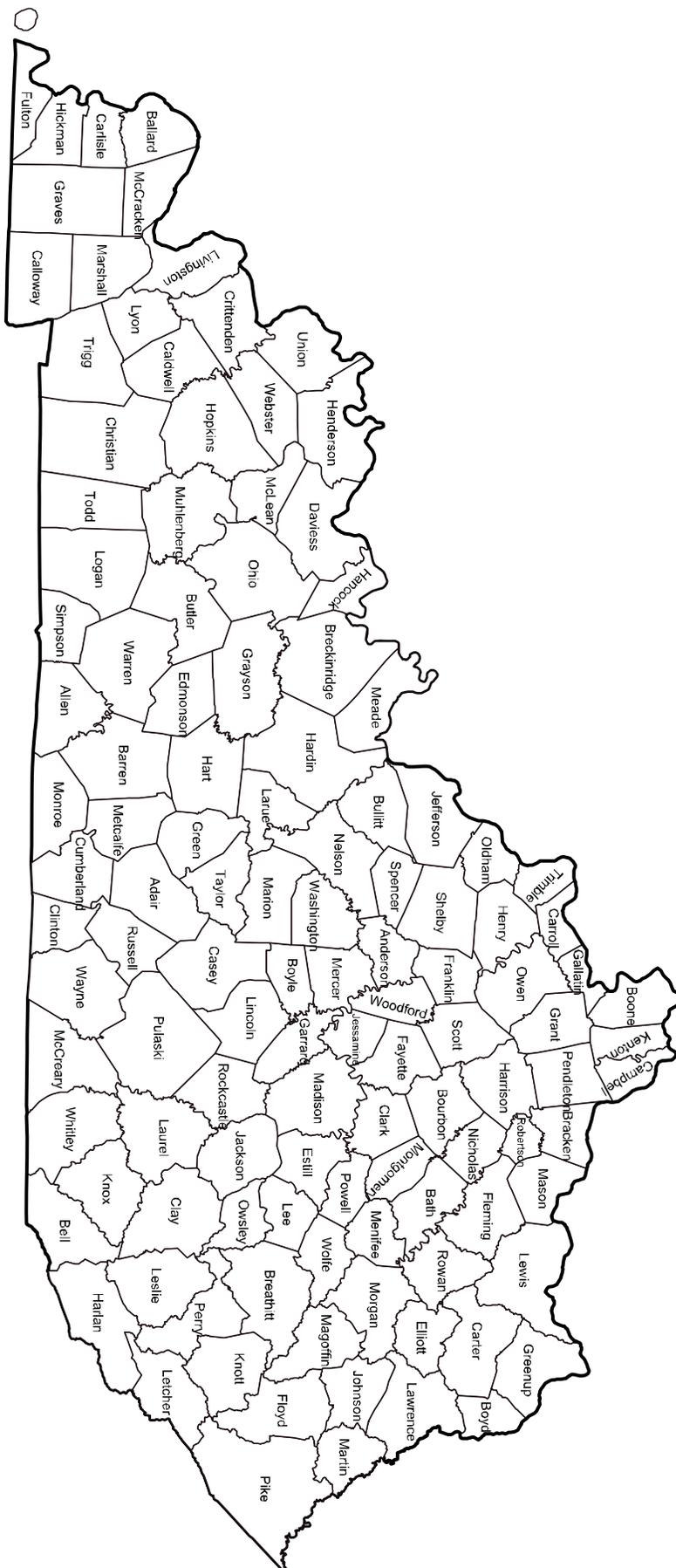
(091) Okaloosa  
(093) Okeechobee  
(095) Orange  
(097) Osceola  
(099) Palm Beach  
(101) Pasco  
(103) Pinellas  
(105) Polk  
(107) Putnam  
(109) St. Johns  
(111) St. Lucie  
(113) Santa Rosa  
(115) Sarasota  
(117) Seminole  
(119) Sumter  
(121) Suwannee  
(123) Taylor  
(125) Union  
(127) Volusia  
(129) Wakulla  
(131) Walton  
(133) Washington



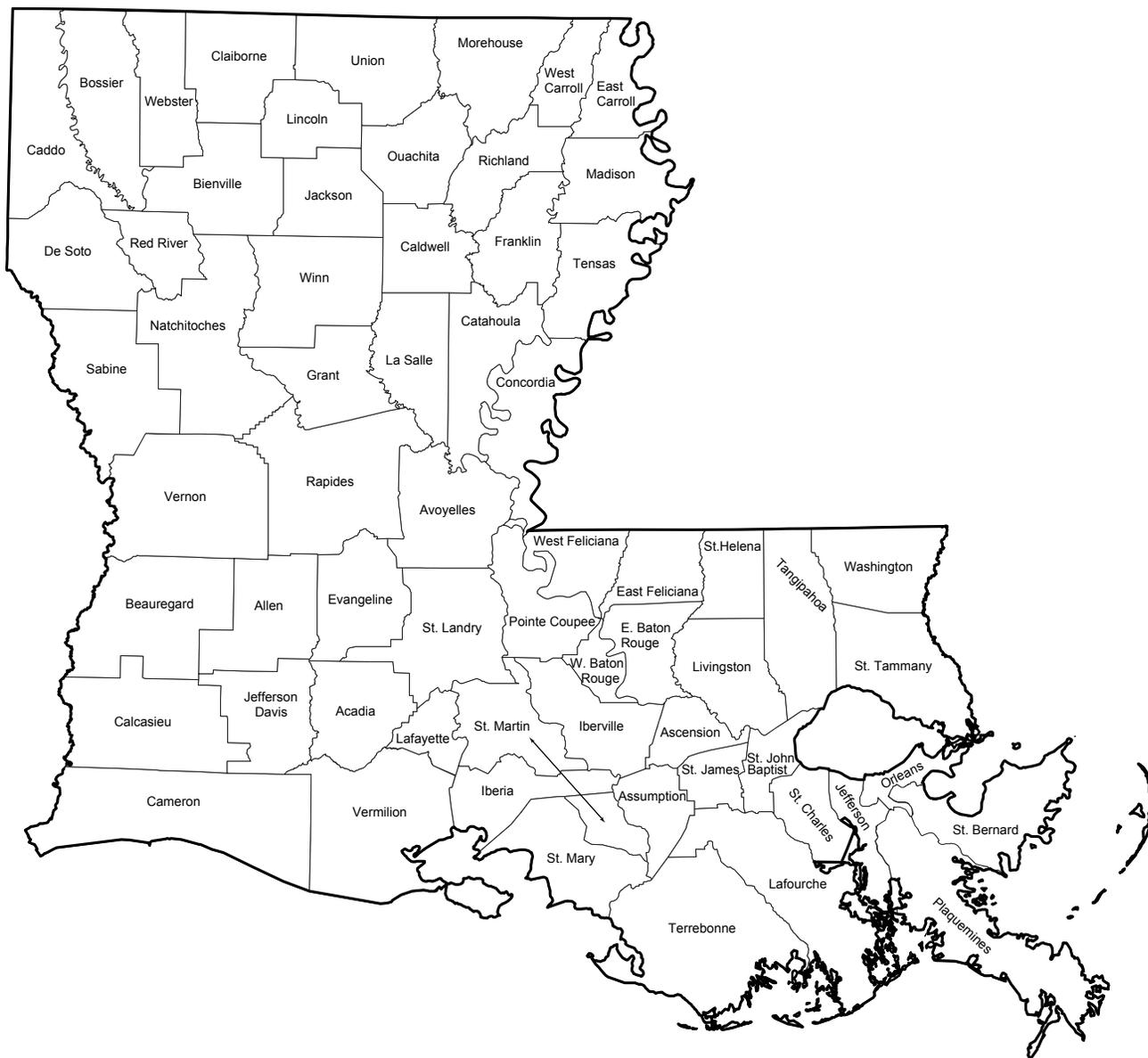
<b>(13) Georgia</b>	(109) Evans	(219) Oconee
(001) Appling	(111) Fannin	(221) Oglethorpe
(003) Atkinson	(113) Fayette	(223) Paulding
(005) Bacon	(115) Floyd	(225) Peach
(007) Baker	(117) Forsyth	(227) Pickens
(009) Baldwin	(119) Franklin	(229) Pierce
(011) Banks	(121) Fulton	(231) Pike
(013) Barrow	(123) Gilmer	(233) Polk
(015) Bartow	(125) Glascock	(235) Pulaski
(017) Ben Hill	(127) Glynn	(237) Putnam
(019) Berrien	(129) Gordon	(239) Quitman
(021) Bibb	(131) Grady	(241) Rabun
(023) Bleckley	(133) Greene	(243) Randolph
(025) Brantley	(135) Gwinnett	(245) Richmond
(027) Brooks	(137) Habersham	(247) Rockdale
(029) Bryan	(139) Hall	(249) Schley
(031) Bulloch	(141) Hancock	(251) Screven
(033) Burke	(143) Haralson	(253) Seminole
(035) Butts	(145) Harris	(255) Spalding
(037) Calhoun	(147) Hart	(257) Stephens
(039) Camden	(149) Heard	(259) Stewart
(043) Candler	(151) Henry	(261) Sumter
(045) Carroll	(153) Houston	(263) Talbot
(047) Catoosa	(155) Irwin	(265) Taliaferro
(049) Charlton	(157) Jackson	(267) Tattnall
(051) Chatham	(159) Jasper	(269) Taylor
(053) Chattahoochee	(161) Jeff Davis	(271) Telfair
(055) Chattooga	(163) Jefferson	(273) Terrell
(057) Cherokee	(165) Jenkins	(275) Thomas
(059) Clarke	(167) Johnson	(277) Tift
(061) Clay	(169) Jones	(279) Toombs
(063) Clayton	(171) Lamar	(281) Towns
(065) Clinch	(173) Lanier	(283) Treutlen
(067) Cobb	(175) Laurens	(285) Troup
(069) Coffee	(177) Lee	(287) Turner
(071) Colquitt	(179) Liberty	(289) Twiggs
(073) Columbia	(181) Lincoln	(291) Union
(075) Cook	(183) Long	(293) Upson
(077) Coweta	(185) Lowndes	(295) Walker
(079) Crawford	(187) Lumpkin	(297) Walton
(081) Crisp	(189) Mc Duffie	(299) Ware
(083) Dade	(191) Mc Intosh	(301) Warren
(085) Dawson	(193) Macon	(303) Washington
(087) Decatur	(195) Madison	(305) Wayne
(089) De Kalb	(197) Marion	(307) Webster
(091) Dodge	(199) Meriwether	(309) Wheeler
(093) Dooly	(201) Miller	(311) White
(095) Dougherty	(205) Mitchell	(313) Whitfield
(097) Douglas	(207) Monroe	(315) Wilcox
(099) Early	(209) Montgomery	(317) Wilkes
(101) Echols	(211) Morgan	(319) Wilkinson
(103) Effingham	(213) Murray	(321) Worth
(105) Elbert	(215) Muscogee	
(107) Emanuel	(217) Newton	



<b>(21) Kentucky</b>	(081) Grant	(163) Meade
(001) Adair	(083) Graves	(165) Meniffee
(003) Allen	(085) Grayson	(167) Mercer
(005) Anderson	(087) Green	(169) Metcalfe
(007) Ballard	(089) Greenup	(171) Monroe
(009) Barren	(091) Hancock	(173) Montgomery
(011) Bath	(093) Hardin	(175) Morgan
(013) Bell	(095) Harlan	(177) Muhlenberg
(015) Boone	(097) Harrison	(179) Nelson
(017) Bourbon	(099) Hart	(181) Nicholas
(019) Boyd	(101) Henderson	(183) Ohio
(021) Boyle	(103) Henry	(185) Oldham
(023) Bracken	(105) Hickman	(187) Owen
(025) Breathitt	(107) Hopkins	(189) Owsley
(027) Breckinridge	(109) Jackson	(191) Pendleton
(029) Bullitt	(111) Jefferson	(193) Perry
(031) Butler	(113) Jessamine	(195) Pike
(033) Caldwell	(115) Johnson	(197) Powell
(035) Calloway	(117) Kenton	(199) Pulaski
(037) Campbell	(119) Knott	(201) Robertson
(039) Carlisle	(121) Knox	(203) Rockcastle
(041) Carroll	(123) Larue	(205) Rowan
(043) Carter	(125) Laurel	(207) Russell
(045) Casey	(127) Lawrence	(209) Scott
(047) Christian	(129) Lee	(211) Shelby
(049) Clark	(131) Leslie	(213) Simpson
(051) Clay	(133) Letcher	(215) Spencer
(053) Clinton	(135) Lewis	(217) Taylor
(055) Crittenden	(137) Lincoln	(219) Todd
(057) Cumberland	(139) Livingston	(221) Trigg
(059) Daviess	(141) Logan	(223) Trimble
(061) Edmonson	(143) Lyon	(225) Union
(063) Elliott	(145) McCracken	(227) Warren
(065) Estill	(147) McCreary	(229) Washington
(067) Fayette	(149) McLean	(231) Wayne
(069) Fleming	(151) Madison	(233) Webster
(071) Floyd	(153) Magoffin	(235) Whitley
(073) Franklin	(155) Marion	(237) Wolfe
(075) Fulton	(157) Marshall	(239) Woodford
(077) Gallatin	(159) Martin	
(079) Garrard	(161) Mason	



<b>(22) Louisiana</b>	(043) Grant	(087) St. Bernard
(001) Acadia	(045) Iberia	(089) St. Charles
(003) Allen	(047) Iberville	(091) St. Helena
(005) Ascension	(049) Jackson	(093) St. James
(007) Assumption	(051) Jefferson	(095) St. John the Baptist
(009) Avoyelles	(053) Jefferson Davis	(097) St. Landry
(011) Beauregard	(055) Lafayette	(099) St. Martin
(013) Bienville	(057) LaFourche	(101) St. Mary
(015) Bossier	(059) La Salle	(103) St. Tammany
(017) Caddo	(061) Lincoln	(105) Tangipahoa
(019) Calcasieu	(063) Livingston	(107) Tensas
(021) Caldwell	(065) Madison	(109) Terrebonne
(023) Cameron	(067) Morehouse	(111) Union
(025) Catahoula	(069) Natchitoches	(113) Vermilion
(027) Claiborne	(071) Orleans	(115) Vernon
(029) Concordia	(073) Ouachita	(117) Washington
(031) De Soto	(075) Plaquemines	(119) Webster
(033) East Baton Rouge	(077) Pointe Coupee	(121) West Baton Rouge
(035) East Carroll	(079) Rapides	(123) West Carroll
(037) East Feliciana	(081) Red River	(125) West Feliciana
(039) Evangeline	(083) Richland	(127) Winn
(041) Franklin	(085) Sabine	

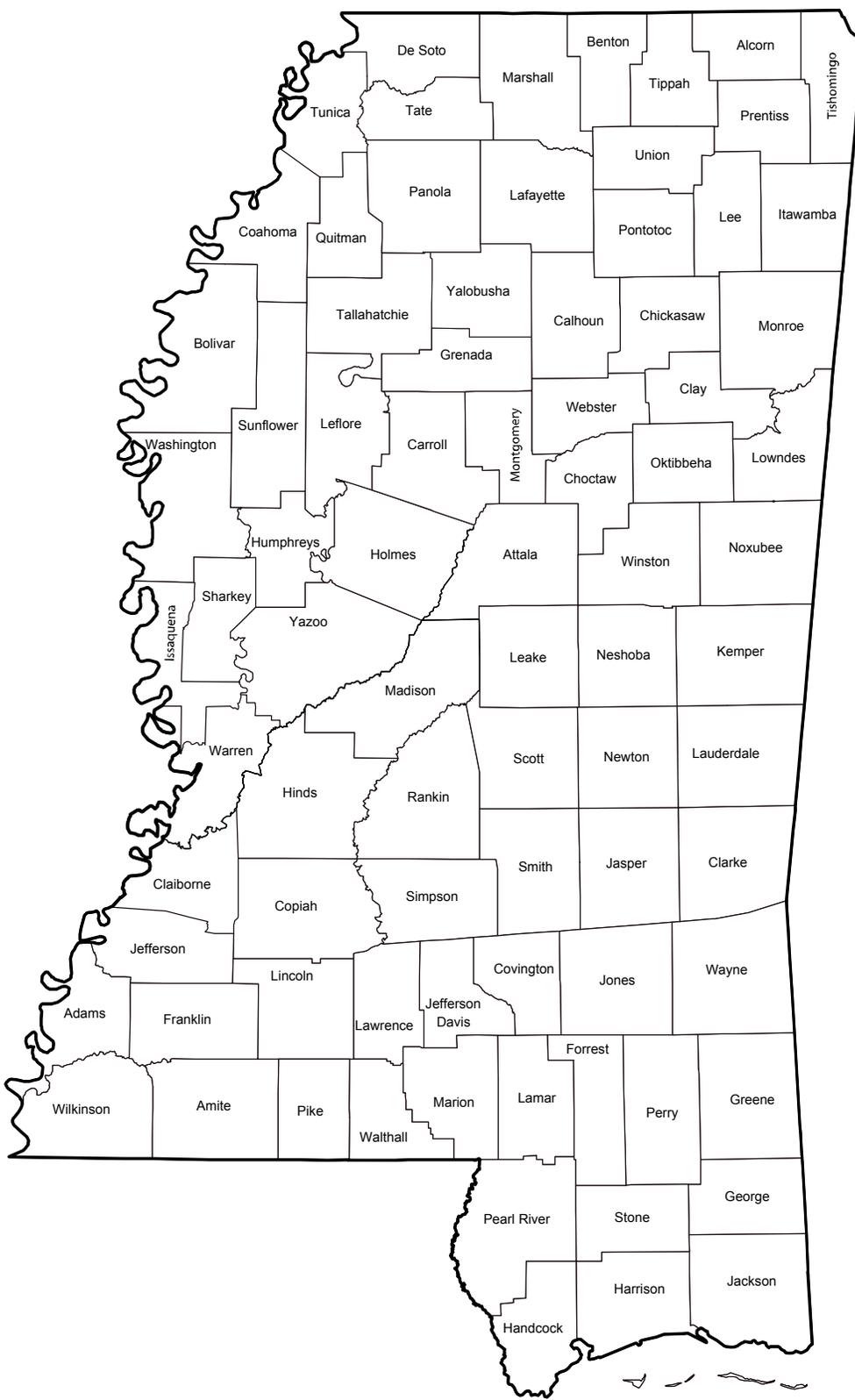


**(28) Mississippi**

(001) Adams  
 (003) Alcorn  
 (005) Amite  
 (007) Attala  
 (009) Benton  
 (011) Bolivar  
 (013) Calhoun  
 (015) Carroll  
 (017) Chickasaw  
 (019) Choctaw  
 (021) Claiborne  
 (023) Clarke  
 (025) Clay  
 (027) Coahoma  
 (029) Copiah  
 (031) Covington  
 (033) De Soto  
 (035) Forrest  
 (037) Franklin  
 (039) George  
 (041) Greene  
 (043) Grenada  
 (045) Hancock  
 (047) Harrison  
 (049) Hinds  
 (051) Holmes  
 (053) Humphreys

(055) Issaquena  
 (057) Itawamba  
 (059) Jackson  
 (061) Jasper  
 (063) Jefferson  
 (065) Jefferson Davis  
 (067) Jones  
 (069) Kemper  
 (071) Lafayette  
 (073) Lamar  
 (075) Lauderdale  
 (077) Lawrence  
 (079) Leake  
 (081) Lee  
 (083) Leflore  
 (085) Lincoln  
 (087) Lowndes  
 (089) Madison  
 (091) Marion  
 (093) Marshall  
 (095) Monroe  
 (097) Montgomery  
 (099) Neshoba  
 (101) Newton  
 (103) Noxubee  
 (105) Oktibbeha  
 (107) Panola  
 (109) Pearl River

(111) Perry  
 (113) Pike  
 (115) Pontotoc  
 (117) Prentiss  
 (119) Quitman  
 (121) Rankin  
 (123) Scott  
 (125) Sharkey  
 (127) Simpson  
 (129) Smith  
 (131) Stone  
 (133) Sunflower  
 (135) Tallahatchie  
 (137) Tate  
 (139) Tippah  
 (141) Tishomingo  
 (143) Tunica  
 (145) Union  
 (147) Walthall  
 (149) Warren  
 (151) Washington  
 (153) Wayne  
 (155) Webster  
 (157) Wilkinson  
 (159) Winston  
 (161) Yalobusha  
 (163) Yazoo

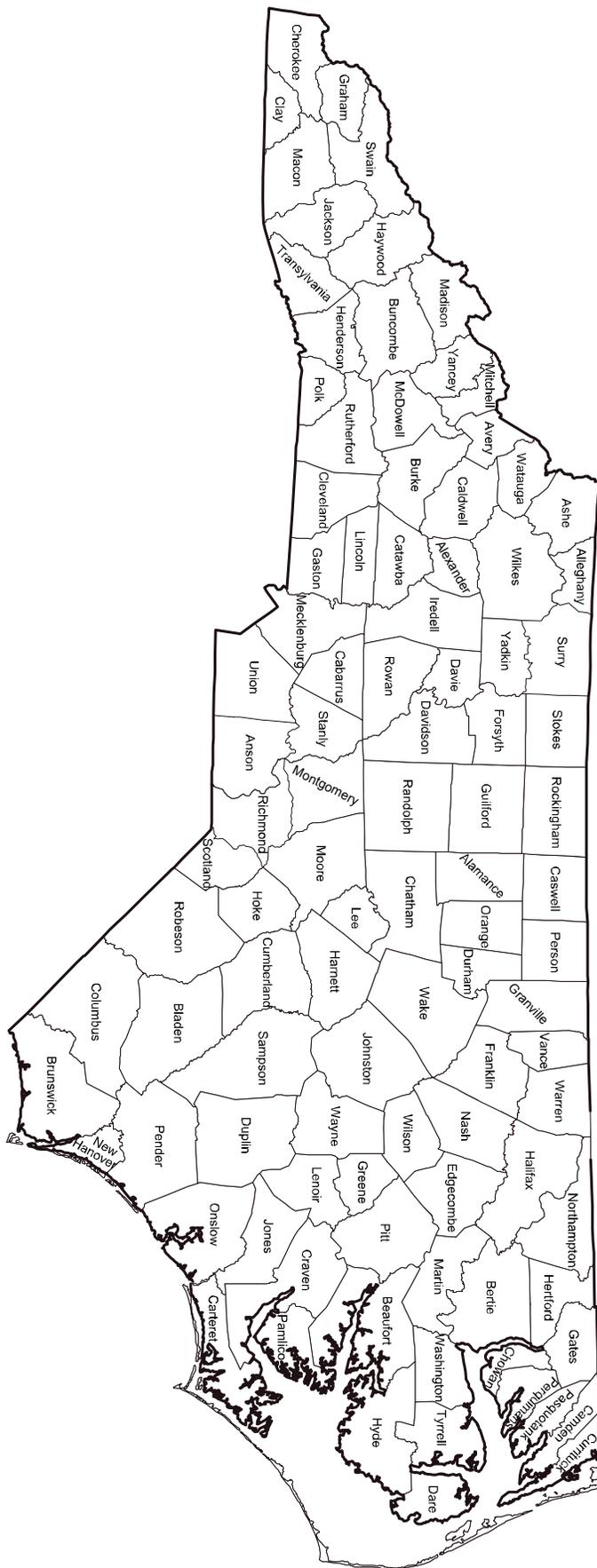


**(37) North Carolina**

(001) Alamance  
 (003) Alexander  
 (005) Alleghany  
 (007) Anson  
 (009) Ashe  
 (011) Avery  
 (013) Beaufort  
 (015) Bertie  
 (017) Bladen  
 (019) Brunswick  
 (021) Buncombe  
 (023) Burke  
 (025) Cabarrus  
 (027) Caldwell  
 (029) Camden  
 (031) Carteret  
 (033) Caswell  
 (035) Catawba  
 (037) Chatham  
 (039) Cherokee  
 (041) Chowan  
 (043) Clay  
 (045) Cleveland  
 (047) Columbus  
 (049) Craven  
 (051) Cumberland  
 (053) Currituck  
 (055) Dare  
 (057) Davidson  
 (059) Davie  
 (061) Duplin  
 (063) Durham  
 (065) Edgecombe  
 (067) Forsyth

(069) Franklin  
 (071) Gaston  
 (073) Gates  
 (075) Graham  
 (077) Granville  
 (079) Greene  
 (081) Guilford  
 (083) Halifax  
 (085) Harnett  
 (087) Haywood  
 (089) Henderson  
 (091) Hertford  
 (093) Hoke  
 (095) Hyde  
 (097) Iredell  
 (099) Jackson  
 (101) Johnston  
 (103) Jones  
 (105) Lee  
 (107) Lenoir  
 (109) Lincoln  
 (111) McDowell  
 (113) Macon  
 (115) Madison  
 (117) Martin  
 (119) Mecklenburg  
 (121) Mitchell  
 (123) Montgomery  
 (125) Moore  
 (127) Nash  
 (129) New Hanover  
 (131) Northhampton  
 (133) Onslow  
 (135) Orange  
 (137) Pamlico

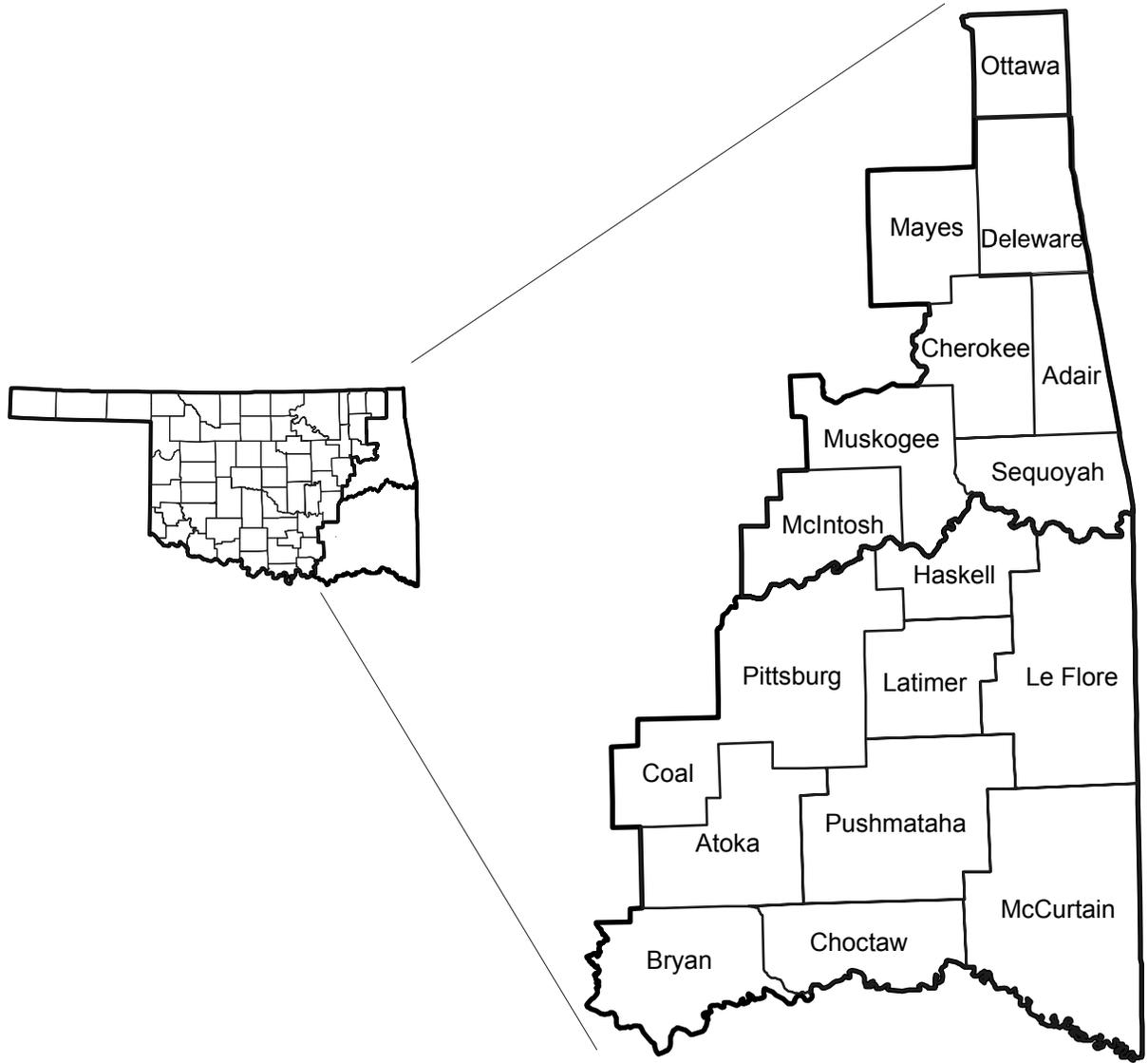
(139) Pasquotank  
 (141) Pender  
 (143) Perquimans  
 (145) Person  
 (147) Pitt  
 (149) Polk  
 (151) Randolph  
 (153) Richmond  
 (155) Robeson  
 (157) Rockingham  
 (159) Rowan  
 (161) Rutherford  
 (163) Sampson  
 (165) Scotland  
 (167) Stanly  
 (169) Stokes  
 (171) Surry  
 (173) Swain  
 (175) Transylvania  
 (177) Tyrrell  
 (179) Union  
 (181) Vance  
 (183) Wake  
 (185) Warren  
 (187) Washington  
 (189) Watauga  
 (191) Wayne  
 (193) Wilkes  
 (195) Wilson  
 (197) Yadkin  
 (199) Yancey



**(40) Oklahoma**  
(001) Adair  
(003) Alfalfa  
(005) Atoka  
(007) Beaver  
(009) Beckham  
(011) Blaine  
(013) Bryan  
(015) Caddo  
(017) Canadian  
(019) Carter  
(021) Cherokee  
(023) Choctaw  
(025) Cimarron  
(027) Cleveland  
(029) Coal  
(031) Comanche  
(033) Cotton  
(035) Craig  
(037) Creek  
(039) Custer  
(041) Delaware  
(043) Dewey  
(045) Ellis  
(047) Garfield  
(049) Garvin  
(051) Grady

(053) Grant  
(055) Greer  
(057) Harmon  
(059) Harper  
(061) Haskell  
(063) Hughes  
(065) Jackson  
(067) Jefferson  
(069) Johnston  
(071) Kay  
(073) Kingfisher  
(075) Kiowa  
(077) Latimer  
(079) Le Flore  
(081) Lincoln  
(083) Logan  
(085) Love  
(087) McClain  
(089) McCurtain  
(091) McIntosh  
(093) Major  
(095) Marshall  
(097) Mayes  
(099) Murray  
(101) Muskogee  
(103) Noble  
(105) Nowata

(107) Okfuskee  
(109) Oklahoma  
(111) Okmulgee  
(113) Osage  
(115) Ottawa  
(117) Pawnee  
(119) Payne  
(121) Pittsburg  
(123) Pontotoc  
(125) Pottawatomie  
(127) Pushmataha  
(129) Roger Mills  
(131) Rogers  
(133) Seminole  
(135) Sequoyah  
(137) Stephens  
(139) Texas  
(141) Tillman  
(143) Tulsa  
(145) Wagoner  
(147) Washington  
(149) Washita  
(151) Woods  
(153) Woodward



**(45) South Carolina**

(001) Abbeville  
(003) Aiken  
(005) Allendale  
(007) Anderson  
(009) Bamberg  
(011) Barnwell  
(013) Beaufort  
(015) Berkeley  
(017) Calhoun  
(019) Charleston  
(021) Cherokee  
(023) Chester  
(025) Chesterfield  
(027) Clarendon  
(029) Colleton

(031) Darlington  
(033) Dillon  
(035) Dorchester  
(037) Edgefield  
(039) Fairfield  
(041) Florence  
(043) Georgetown  
(045) Greenville  
(047) Greenwood  
(049) Hampton  
(051) Horry  
(053) Jasper  
(055) Kershaw  
(057) Lancaster  
(059) Laurens  
(061) Lee

(063) Lexington  
(065) Mc Cormick  
(067) Marion  
(069) Marlboro  
(071) Newberry  
(073) Oconee  
(075) Orangeburg  
(077) Pickens  
(079) Richland  
(081) Saluda  
(083) Spartanburg  
(085) Sumter  
(087) Union  
(089) Williamsburg  
(091) York



**(47) Tennessee**

(001) Anderson	(065) Hamilton	(131) Obion
(003) Bedford	(067) Hancock	(133) Overton
(005) Benton	(069) Hardeman	(135) Perry
(007) Bledsoe	(071) Hardin	(137) Pickett
(009) Blount	(073) Hawkins	(139) Polk
(011) Bradley	(075) Haywood	(141) Putnam
(013) Campbell	(077) Henderson	(143) Rhea
(015) Cannon	(079) Henry	(145) Roane
(017) Carroll	(081) Hickman	(147) Robertson
(019) Carter	(083) Houston	(149) Rutherford
(021) Cheatham	(085) Humphreys	(151) Scott
(023) Chester	(087) Jackson	(153) Sequatchie
(025) Claiborne	(089) Jefferson	(155) Sevier
(027) Clay	(091) Johnson	(157) Shelby
(029) Cocke	(093) Knox	(159) Smith
(031) Coffee	(095) Lake	(161) Stewart
(033) Crockett	(097) Lauderdale	(163) Sullivan
(035) Cumberland	(099) Lawrence	(165) Sumner
(037) Davidson	(101) Lewis	(167) Tipton
(039) Decatur	(103) Lincoln	(169) Trousdale
(041) De Kalb	(105) Loudon	(171) Unicoi
(043) Dickson	(107) Mc Minn	(173) Union
(045) Dyer	(109) Mc Nairy	(175) Van Buren
(047) Fayette	(111) Macon	(177) Warren
(049) Fentress	(113) Madison	(179) Washington
(051) Franklin	(115) Marion	(181) Wayne
(053) Gibson	(117) Marshall	(183) Weakley
(055) Giles	(119) Maury	(185) White
(057) Grainger	(121) Meigs	(187) Williamson
(059) Greene	(123) Monroe	(189) Wilson
(061) Grundy	(125) Montgomery	
(063) Hamblen	(127) Moore	
	(129) Morgan	

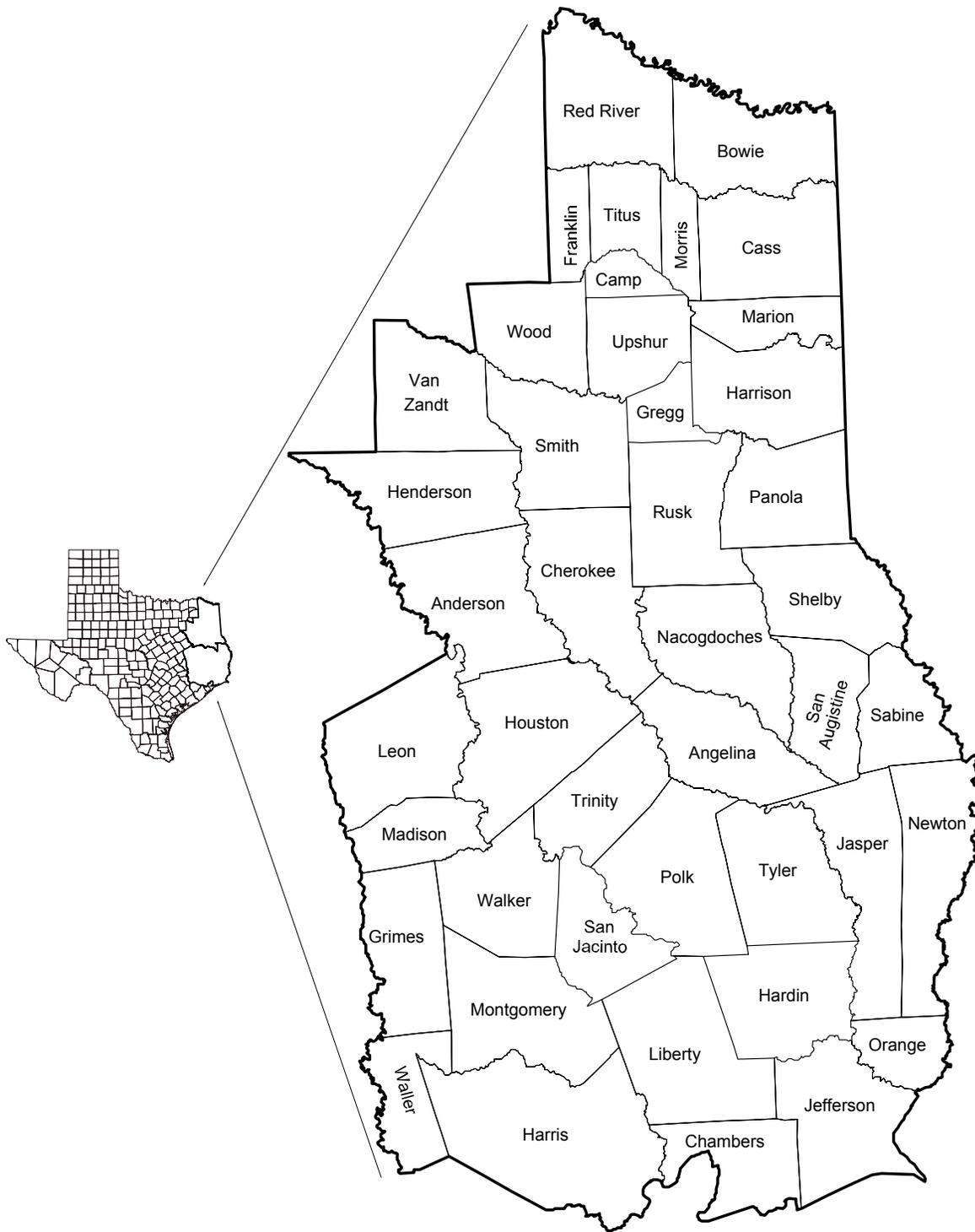


**(48) Texas (East)**

(001) Anderson  
(005) Angelina  
(037) Bowie  
(063) Camp  
(067) Cass  
(071) Chambers  
(073) Cherokee  
(159) Franklin  
(183) Gregg  
(185) Grimes  
(199) Hardin  
(201) Harris  
(203) Harrison  
(213) Henderson  
(225) Houston

(241) Jasper  
(245) Jefferson  
(289) Leon  
(291) Liberty  
(313) Madison  
(315) Marion  
(339) Montgomery  
(343) Morris  
(347) Nacogdoches  
(351) Newton  
(361) Orange  
(365) Panola  
(373) Polk  
(387) Red River  
(401) Rusk  
(403) Sabine

(405) San Augustine  
(407) San Jacinto  
(419) Shelby  
(423) Smith  
(449) Titus  
(455) Trinity  
(457) Tyler  
(459) Upshur  
(467) Van Zandt  
(471) Walker  
(473) Waller  
(499) Wood



<b>(51) Virginia</b>	(071) Giles	(145) Powhatan
(001) Accomack	(073) Gloucester	(147) Prince Edward
(003) Albemarle	(075) Goochland	(149) Prince George
(005) Alleghany	(077) Grayson	(153) Prince William
(007) Amelia	(079) Greene	(155) Pulaski
(009) Amherst	(081) Greensville	(157) Rappahannock
(011) Appomattox	(083) Halifax	(159) Richmond
(013) Arlington	(085) Hanover	(161) Roanoke
(015) Augusta	(087) Henrico	(163) Rockbridge
(017) Bath	(089) Henry	(165) Rockingham
(019) Bedford	(091) Highland	(167) Russell
(021) Bland	(093) Isle of Wight	(169) Scott
(023) Botetourt	(095) James City	(171) Shenandoah
(025) Brunswick	(097) King and Queen	(173) Smyth
(027) Buchanan	(099) King George	(175) Southampton
(029) Buckingham	(101) King William	(177) Spotsylvania
(031) Campbell	(103) Lancaster	(179) Stafford
(033) Caroline	(105) Lee	(181) Surry
(035) Carroll	(107) Loudoun	(183) Sussex
(036) Charles City	(109) Louisa	(185) Tazewell
(037) Charlotte	(111) Lunenburg	(187) Warren
(041) Chesterfield	(113) Madison	(191) Washington
(043) Clarke	(115) Mathews	(193) Westmoreland
(045) Craig	(117) Mecklenburg	(195) Wise
(047) Culpeper	(119) Middlesex	(197) Wythe
(049) Cumberland	(121) Montgomery	(199) York
(051) Dickenson	(125) Nelson	(550) Chesapeake City
(053) Dinwiddie	(127) New Kent	(650) Hampton City
(057) Essex	(131) Northampton	(700) Newport News City
(059) Fairfax	(133) Northumberland	(800) Suffolk City
(061) Fauquier	(135) Nottoway	(810) Virginia Beach City
(063) Floyd	(137) Orange	
(065) Fluvanna	(139) Page	
(067) Franklin	(141) Patrick	
(069) Frederick	(143) Pittsylvania	



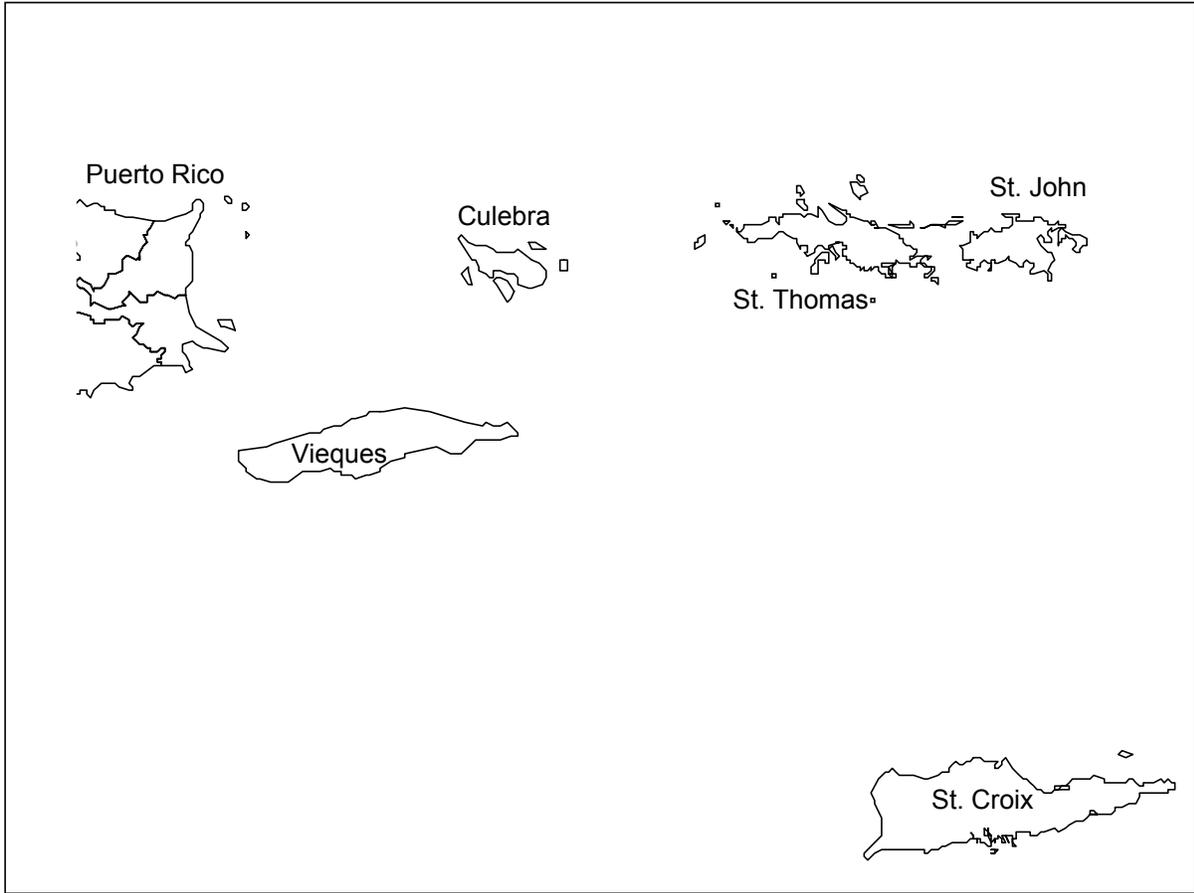
**(72) Puerto Rico**  
 (001) Adjuntas  
 (003) Aguada  
 (005) Aguadilla  
 (007) Aguas Buenas  
 (009) Aibonito  
 (011) Anasco  
 (013) Arecibo  
 (015) Arroyo  
 (017) Barceloneta  
 (019) Barranquitas  
 (021) Bayamon  
 (023) Cabo Rojo  
 (025) Caguas  
 (027) Camuy  
 (029) Canovanas  
 (031) Carolina  
 (033) Catano  
 (035) Cayey  
 (037) Ceiba  
 (039) Ciales  
 (041) Cidra  
 (043) Coamo  
 (045) Comerio  
 (047) Corozal  
 (049) Culebra  
 (051) Dorado  
 (053) Fajardo  
 (054) Florida

(055) Guanica  
 (057) Guayama  
 (059) Guayanilla  
 (061) Guaynabo  
 (063) Gurabo  
 (065) Hatillo  
 (067) Hormigueros  
 (069) Humacao  
 (071) Isabela Municipio  
 (073) Jayuya  
 (075) Juana Diaz  
 (077) Juncos  
 (079) Lajas  
 (081) Lares  
 (083) Las Marias  
 (085) Las Piedras  
 (087) Loiza  
 (089) Luquillo  
 (091) Manati  
 (093) Maricao  
 (095) Maunabo  
 (097) Mayaguez  
 (099) Moca  
 (101) Morovis  
 (103) Naguabo  
 (105) Naranjito  
 (107) Orocovis  
 (109) Patillas  
 (111) Penuelas

(113) Ponce  
 (115) Quebradillas  
 (117) Rincon  
 (119) Rio Grande  
 (121) Sabana Grande  
 (123) Salinas  
 (125) San German  
 (127) San Juan  
 (129) San Lorenzo  
 (131) San Sebastian  
 (133) Santa Isabel  
 (135) Toa Alta  
 (137) Toa Baja  
 (139) Trujillo Alto  
 (141) Utuado  
 (143) Vega Alta  
 (145) Vega Baja  
 (147) Vieques  
 (149) Villalba  
 (151) Yabucoa  
 (153) Yuaco

**(78) U.S. Virgin Islands**  
 (010) St. Croix Island  
 (020) St. John Island  
 (030) St. Thomas Island





**Appendix 2. FIA Forest Type Codes**

This following list includes all forest types in the Continental U.S. and Alaska Types designated East/West are commonly found in those regions, although types designated for one region may occasionally be found in another.

<b>East</b>	<b>West</b>	<b>Code</b>	<b>Species Type</b>
<b>White / Red / Jack Pine Group</b>			
E		101	Jack pine
E		102	Red pine
E		103	Eastern white pine
E		104	Eastern white pine / eastern hemlock
E		105	Eastern hemlock
<b>Spruce / Fir Group</b>			
E		121	Balsam fir
E		122	White spruce
E		123	Red spruce
E		124	Red spruce / balsam fir
E	W	125	Black spruce
E		126	Tamarack
E		127	Northern white-cedar
E		128	Fraser fir
E		129	Red spruce / Fraser fir
<b>Longleaf / Slash Pine Group</b>			
E		141	Longleaf pine
E		142	Slash pine
<b>Tropical Softwoods Group</b>			
E		151	Tropical pines
<b>Loblolly / Shortleaf Pine Group</b>			
E		161	Loblolly pine
E		162	Shortleaf pine
E		163	Virginia pine
E		164	Sand pine
E		165	Table-mountain pine
E		166	Pond pine
E		167	Pitch pine
E		168	Spruce pine
<b>Other Eastern Softwoods Group</b>			
E		171	Eastern redcedar
E		172	Florida softwoods
<b>Pinyon / Juniper Group</b>			
E	W	182	Rocky Mountain juniper
E	W	184	Juniper woodland
E	W	185	Pinyon-juniper woodland
<b>Douglas-fir Group</b>			
E	W	201	Douglas-fir
	W	202	Port-Orford-cedar
	W	203	Bigcone Douglas-fir
<b>Ponderosa Pine Group</b>			
E	W	221	Ponderosa pine
	W	222	Incense-cedar

<b>East</b>	<b>West</b>	<b>Code</b>	<b>Species Type</b>
	W	224	Sugar pine
	W	225	Jeffrey pine
	W	226	Coulter pine
			<b>Western White Pine Group</b>
	W	241	Western white pine
			<b>Fir / Spruce / Mountain Hemlock Group</b>
	W	261	White fir
	W	262	Red fir
	W	263	Noble fir
	W	264	Pacific silver fir
	W	265	Engelmann spruce
	W	266	Engelmann spruce / subalpine fir
	W	267	Grand fir
	W	268	Subalpine fir
	W	269	Blue spruce
	W	270	Mountain hemlock
	W	271	Alaska-yellow-cedar
			<b>Lodgepole Pine Group</b>
	W	281	Lodgepole pine
			<b>Hemlock / Sitka Spruce Group</b>
	W	301	Western hemlock
	W	304	Western redcedar
	W	305	Sitka spruce
			<b>Western Larch Group</b>
	W	321	Western larch
			<b>Redwood Group</b>
	W	341	Redwood
	W	342	Giant sequoia
			<b>Other Western Softwoods Group</b>
	W	361	Knobcone pine
	<b>W</b>	<b>362</b>	<b>Southwestern white pine</b>
	W	363	Bishop pine
	W	364	Monterey pine
	W	365	Foxtail pine / bristlecone pine
	W	366	Limber pine
	W	367	Whitebark pine
	<b>W</b>	<b>368</b>	<b>Misc. western softwoods</b>
	W	369	Western juniper
			<b>California Mixed Conifer Group</b>
	W	371	California mixed conifer
			<b>Exotic Softwoods Group</b>
<b>E</b>		381	Scotch pine
<b>E</b>	<b>W</b>	383	Other exotic softwoods
<b>E</b>		384	Norway spruce
<b>E</b>		385	Introduced larch
			<b>Other Softwoods Group</b>
		391	Other softwoods

East	West	Code	Species Type
<b>Oak / Pine Group</b>			
E		401	Eastern white pine / N. red oak / white ash
E		402	Eastern redcedar / hardwood
E		403	Longleaf pine / oak
E		404	Shortleaf pine / oak
E		405	Virginia pine / southern red oak
E		406	Loblolly pine / hardwood
E		407	Slash pine / hardwood
E		409	Other pine / hardwood
<b>Oak / Hickory Group</b>			
E		501	Post oak / blackjack oak
E		502	Chestnut oak
E		503	White oak / red oak / hickory
E		504	White oak
E		505	Northern red oak
E		506	Yellow-poplar / white oak / N. red oak
E		507	Sassafras / persimmon
E		508	Sweetgum / yellow-poplar
E		509	Bur oak
E		510	Scarlet oak
E		511	Yellow-poplar
E		512	Black walnut
E		513	Black locust
E		514	Southern scrub oak
E		515	Chestnut oak / black oak / scarlet oak
E		516	Cherry / white ash / yellow-poplar
E		517	Elm / ash / black locust
E		519	Red maple / oak
E		520	Mixed upland hardwoods
<b>Oak / Gum / Cypress Group</b>			
E		601	Swamp chestnut oak / cherrybark oak
E		602	Sweetgum / Nuttall oak / willow oak
E		605	Overcup oak / water hickory
E		606	Atlantic white-cedar
E		607	Baldcypress / water tupelo
E		608	Sweetbay / swamp tupelo / red maple
E		609	Baldcypress / pondcypress
<b>Elm / Ash / Cottonwood Group</b>			
E		701	Black ash / American elm / red maple
E		702	River birch / sycamore
E	W	703	Cottonwood
E	W	704	Willow
E		705	Sycamore / pecan / American elm
E		706	Sugarberry / hackberry / elm / green ash
E		707	Silver maple / American elm
E		708	Red maple / lowland
E	W	709	Cottonwood / willow
	W	722	Oregon ash
<b>Maple / Beech / Birch Group</b>			
E		801	Sugar maple / beech / yellow birch
E		802	Black cherry
E		805	Hard maple / basswood
E		809	Red maple / upland

East	West	Code	Species Type
			<b>Aspen / Birch Group</b>
E	W	901	Aspen
E	W	902	Paper birch
E		903	Gray birch
E	W	904	Balsam poplar
E	W	905	Pin cherry
			<b>Alder / Maple Group</b>
	W	911	Red alder
	W	912	Bigleaf maple
			<b>Western Oak Group</b>
	W	921	Gray pine
	W	922	California black oak
	W	923	Oregon white oak
	W	924	Blue oak
	W	931	Coast live oak
	W	933	Canyon live oak
	W	934	Interior live oak
	W	935	California white oak (valley oak)
			<b>Tanoak / Laurel Group</b>
	W	941	Tanoak
	W	942	California laurel
	W	943	Giant chinkapin
			<b>Other Harwoods Group</b>
	W	961	Pacific madrone
	W	962	Other hardwoods
			<b>Woodland Hardwoods Group</b>
	W	971	Deciduous oak woodland
	W	972	Evergreen oak woodland
	W	973	Mesquite woodland
	W	974	Cercocarpus (Mountain brush) woodland
	W	975	Intermountain maple woodland
	W	976	Misc. woodland hardwoods
			<b>Tropical Hardwoods Group</b>
E		982	Mangrove
E	W	983	Palms
E		989	Other tropical hardwoods
			<b>Exotic Hardwoods Group</b>
E		991	Paulownia
E		992	Melaleuca
E	W	993	Eucalyptus
E	W	995	Other exotic hardwoods

For nonstocked stands, see section 2.5.3 for procedures to determine FOREST TYPE.

Unless otherwise stated, forest types are named for the predominant species (or group of species) on the condition. In order to determine if the type should be classified as softwood versus hardwood, first estimate the stocking (site occupancy) of trees in each of these two categories. If softwoods predominate (50% or more), then the forest type will be one of the softwood types (codes 101 through 391) and vice versa for hardwoods (codes 401 through 995).

For the Eastern United States, there are mixed hardwood-pine forest types (codes 401 through 409) when the pine and/or redcedar (either eastern or southern) component is between 25 and 49% of the stocking. If the pine/redcedar component is less than 25% of the stocking, then one of the hardwood forest types is assigned.

#### WHITE/RED/JACK PINE GROUP

In these pure pine forest types, stocking of the pine component needs to be at least 50 percent. Otherwise, check the forest types listed under the Oak / Pine Group (beginning with forest type code (401).

101 Jack pine: Associates – northern pin oak, bur oak, red pine, bigtooth aspen, paper birch, northern red oak, eastern white pine, red maple, balsam fir, white spruce, black spruce, and tamarack.. Sites -- Dry to mesic sites.

102 Red pine: Associates – eastern white pine, jack pine, red maple, northern red oak, white spruce, balsam fir, quaking aspen, bigtooth aspen, paper birch, northern pin oak. Sites -- common on sandy soils, but reaches best development on well-drained sandy loam to loam soils.

103 Eastern white pine: Associates – pitch pine, gray birch, aspen, red maple, pin cherry, white oak, paper birch, sweet birch, yellow birch, black cherry, white ash, northern red oak, sugar maple, basswood, hemlock, northern white-cedar, yellow-poplar, white oak, chestnut oak, scarlet oak, and shortleaf pine. Sites -- wide variety, but best development on well drained sands and sandy loams.

104 Eastern white pine/ eastern hemlock (includes Carolina hemlock): Associates – beech, sugar maple, basswood, red maple, yellow birch, gray birch, red spruce, balsam fir, black cherry, white ash, paper birch, sweet birch, northern red oak, white oak, chestnut oak, yellow-poplar, and cucumbertree. Sites -- wide variety but favors cool locations, moist ravines, and north slopes.

105 Eastern hemlock (includes Carolina hemlock): Associates – white pine, balsam fir, red spruce, beech, sugar maple, yellow birch, basswood, red maple, black cherry, white ash, paper birch, sweet birch, northern red oak, and white oak. Sites -- cool locations, moist ravines, and north and east slopes.

#### SPRUCE/FIR GROUP

These types are mostly in the Eastern United States. See FIR/SPRUCE/MOUNTAIN HEMLOCK for Western United States.

121 Balsam fir: Associates – black, white, or red spruce; paper or yellow birch; quaking or bigtooth aspen, beech; red maple; hemlock; tamarack; black ash; or northern white-cedar. Sites -- upland sites on low-lying moist flats and in swamps.

122 White spruce: Associates – black spruce, paper birch, quaking aspen, red spruce, balsam fir, and balsam poplar. Sites -- Transcontinental; grows well on calcareous and well-drained soils, but is found on acidic rocky and sandy sites, and sometimes in fen peatlands along the maritime coast.

123 Red spruce: Associates – vary widely and may include red maple, yellow birch, eastern hemlock, eastern white pine, white spruce, northern white-cedar, paper birch, pin cherry, gray birch, mountain-ash, beech, striped maple, sugar maple, northern red oak, red pine, and aspen. Sites -- include moderately well-drained to poorly drained flats and thin slopes and on varying acidic soils in abandoned fields and pastures. This code should be used where red spruce comprises a plurality or majority of the stand's stocking but where balsam fir is either nonexistent or has very little stocking (< 5 percent of total). Otherwise the plot would be coded 124, red spruce/balsam fir.

124 Red spruce/balsam fir: Associates – red maple, paper birch, white pine, hemlock, white spruce, and northern white-cedar. Sites -- moderately drained to poorly drained flats or on thin-soiled upper slopes.

125 Black spruce: Associates – white spruce, quaking aspen, balsam fir, paper birch, tamarack, northern white-cedar, black ash, and red maple. Sites -- wide variety from moderately dry to very wet.

126 Tamarack: Associates – black spruce, balsam fir, white spruce, northern white-cedar, and quaking aspen. Sites -- found on wetlands and poorly drained sites.

127 Northern white-cedar: Associates – balsam fir, tamarack, black spruce, white spruce, red spruce, black ash, and red maple. Sites -- mainly occurs in swamps, but also in seepage areas, limestone uplands and old fields.

128 Fraser fir: Associates – red spruce, hemlock, yellow birch, less frequently, beech, sugar maple, yellow buckeye, mountain-ash, and mountain maple. Sites -- mainly occurs in the Appalachian Mountains of North Carolina and Tennessee. This type is used if the stocking of Fraser fir is at least 50 percent of the total stocking.

129 Red spruce/Fraser fir: Associates – hemlock, yellow birch, and less frequently, beech, sugar maple, yellow buckeye, mountain-ash, and mountain maple. Sites -- mainly occurs in the Appalachian Mountains of North Carolina and Tennessee. For this type to be used, the sum of the stocking of red spruce and Fraser fir must be at least 50 percent of the total stocking and red spruce stocking must be between 5 and 49 percent of total and Fraser fir stocking must be between 5 and 49 percent of total.

#### LONGLEAF/SLASH PINE GROUP

141 Longleaf pine: Longleaf pine occurs as a pure type or comprises a majority of the trees in the overstory. Associates-slash, loblolly and shortleaf pine, southern red oak, blackjack oak, water oak, persimmon, and sweetgum. Sites - -those areas that can and do burn on a periodic basis--usually occurs on middle and upper slopes with a low severity of hardwood and brush competition. SRS distribution--coastal plain and piedmont units.

142 Slash pine: Slash pine is pure or provides a majority of the stocking. Associates--on moist sites; a wide variety of moist-site hardwoods, pond pine, and pondcypress. On dry sites; a wide variety of dry-site hardwoods, longleaf, loblolly, and sand pine. Sites -- both moist and well-drained flatwoods, and bays. SRS distribution--coastal plain and piedmont units from North Carolina to Florida.

#### TROPICAL SOFTWOODS GROUP

151 Tropical pines: Tropical pine forests and plantations comprised of Caribbean pine (*Pinus caribea*). Associates are *P. oocarpa*, *P. patula* and other pine species native to the Florida Keys, Caribbean, Central America and Mexico. Pines are not native to Puerto Rico or the U.S. Virgin Islands but can be found in plantations or naturally regenerating to a limited extent on sites that were formerly plantations. *P. caribea* was once rare on the South Florida mainland, but practically non-existent there now and it is not used in plantations in Florida.

#### LOBLOLLY/SHORTLEAF PINE GROUP

161 Loblolly pine: Associates – sweetgum, southern red oak, post oak, blackjack oak, blackgum, yellow-poplar, and pond pine. Sites -- upland soils with abundant moisture but good drainage, and on poorly drained depressions.

162 Shortleaf pine: Associates – white oak, southern red oak, scarlet oak, black oak, hickory, post oak, blackjack oak, blackgum, red maple, pitch pine, and Virginia pine. Sites -- low, well drained ridges to rocky, dry, south slopes and the better drained spur ridges on north slopes and also on old fields.

163 Virginia pine: Associates – shortleaf pine, white oak, chestnut oak, southern red oak, black oak, sweetgum, red maple, blackgum, and pitch pine. Sites--dry sites, often abandoned fields.

164 Sand pine: Sand pine occurs in pure stands or provides a majority of the stocking. Associates--dwarf live oak, dwarf post oak, turkey oak, persimmon, and longleaf pine. Sites -- dry, acidic, infertile sands. SRS distribution--found chiefly in the central peninsula and panhandle of Florida, although planted stands extend into the sandhills of Georgia and South Carolina.

165 Table-mountain pine: Associates – chestnut oak, scarlet oak, pitch pine, and black oak. Sites --poor, dry, often rocky slopes.

166 Pond pine: Associates – loblolly pine, sweetgum, baldcypress, and Atlantic white-cedar. Sites --rare, but found in southern New Jersey, Delaware, and Maryland in low, poorly drained acres, swamps, and marshes.

167 Pitch pine: Associates – chestnut oak, scarlet oak, table-mountain pine, black oak, and blackgum. Sites -- relatively infertile ridges, dry flats, and slopes.

168 Spruce pine: Spruce pine comprises a majority of the stocking. Associates--any of the moist site softwood or hardwood species. Sites - -moist or poorly drained areas. SRS distribution--this type is rarely encountered and is found almost exclusively in the coastal plain.

#### OTHER EASTERN SOFTWOODS GROUP

171 Eastern redcedar (includes southern redcedar): Associates – gray birch, red maple, sweet birch, Virginia Pine, shortleaf pine, oak. Sites -- usually dry uplands and abandoned fields on limestone outcrops and other shallow soils but can grow well on good sites.

172 Florida softwoods (includes either Florida yew or Florida torreyia): Either of these two species comprises the majority of stocking. Sites -- Along bluffs and ravines of the Apalachicola River and its tributaries in north Florida and South Georgia.

#### PINYON / JUNIPER GROUP

181 Eastern redcedar: Retired – see code 171.

182 Rocky Mountain juniper: Rocky Mountain juniper comprises the majority of stocking. Associates – ponderosa pine, Douglas-fir, other junipers, pinyons, and oaks. Sites -- often found on calcareous and somewhat alkaline soils.

183 Western juniper: Retired – see code 369.

184 Juniper woodland: Includes Pinchot juniper, redberry juniper, Ashe juniper, California juniper, alligator juniper, Utah juniper, oneseed juniper and pinyon is NOT present. Associates: various woodland oaks and cercocarpus, ponderosa pine, Arizona cypress, and Douglas-fir. Sites -- lower elevation with low annual precipitation.

185 Pinyon-juniper woodland: Includes all pinyons and all junipers except Rocky Mountain and western juniper. Must have pinyon present. Associates: various woodland oaks and cercocarpus, ponderosa pine, Arizona cypress, and Douglas-fir. Sites--occurs at lower elevations with low annual precipitation.

#### DOUGLAS-FIR GROUP

201 Douglas-fir: Associates – western hemlock, grand fir, Pacific silver fir, white fir, noble fir, California red fir, western redcedar, bigleaf maple, red alder, ponderosa pine, western white pine, western hemlock, Sitka spruce. Sites -- throughout the western U.S.

202 Port-Orford-cedar: Associates – Douglas-fir, western hemlock, Sitka spruce, grand fir, lodgepole pine, western redcedar, redwood, tanoak, red alder, bigleaf maple and California laurel. Sites --higher elevations tending to occur on northerly aspects.

203 Bigcone Douglas-fir: Associates – Canyon live oak, ponderosa, Jeffrey, sugar, knobcone, and Coulter pines, incense-cedar, white fir, California black oak, California laurel, and bigleaf maple. Sites -- Mainly confined to the Transverse and Peninsular Ranges of southern California. Stands are found on many combinations of slope, aspect, soil, but as elevations increase, the preferred aspect shifts from cooler to warmer slopes.

#### PONDEROSA PINE GROUP

221 Ponderosa pine (includes Arizona pine): Associates – Douglas-fir, lodgepole pine, grand fir, Jeffrey pine, western larch, quaking aspen, Utah juniper, Gambel oak. Sites -- this forest type is distributed over vast areas in the West and therefore can have great differences in environmental conditions.

222 Incense-cedar: Associates – Douglas-fir, ponderosa pine, sugar pine, western white pine, Jeffrey pine, white and grand fir, western hemlock, western redcedar, Port-Orford-cedar, giant sequoia, Oregon white oak, California black oak, tanoak, giant chinkapin, and Pacific madrone; it is rarely found in pure

stands. Sites -- Grows from the coastal fog belt to the dry inland slopes of eastern California and central Oregon. Once established, incense-cedar is a good competitor on hot, dry sites and commonly shares an upper canopy position on southwestern slopes. On cooler, moister aspects, it is usually subdominant to other species.

223 Jeffrey pine/Coulter pine/bigcone Douglas-fir: Retired – see codes 225, 226, 203.

224 Sugar pine: Associates – In the northern part of its range: Douglas-fir, ponderosa pine, grand fir, incense-cedar, western hemlock, western redcedar, Port-Orford-cedar, tanoak, and madrone. In the central part of its range: ponderosa pine, Jeffrey pine, white fir, incense-cedar, California red fir, giant sequoia, and California black oak. Farther south: Jeffrey pine, ponderosa pine, Coulter pine, incense-cedar, white fir, and bigcone Douglas-fir. Sites -- grows in areas that have warm, dry summers and cool, wet, mild winters. Terrain is commonly steep and rugged, favoring warm exposures as the elevation increases. Found in Oregon and California, but is most abundant in the mixed conifer forests on the west slope of the Sierra Nevada.

225 Jeffrey pine: Associates – Incense-cedar, ponderosa pine, sugar pine, Douglas-fir, Port-Orford-cedar, western white pine, knobcone pine, Digger pine, red and white fir. Sites -- thrives in fairly harsh environments throughout most of its range, and is cold hardy, drought tolerant, adapted to short growing seasons, and tolerant of infertile sites. The majority of trees are found in California, although its range extends into SW Oregon and western Nevada.

226 Coulter pine: Associates – blue oak, California black oak, interior live oak, coast live oak, valley oak, California scrub oak, buckeye, ponderosa pine. Sites -- grows singly or in small stands primarily on dry, rocky slopes of southern California coastal ranges, between 3,000 and 6,000 feet. Occurs from Mt. Diablo and the Santa Lucia Mountains down to the San Bernardino, San Jacinto, and Cuyamaca Mountains in the south.

#### WESTERN WHITE PINE GROUP

241 Western white pine: Associates – western larch, grand fir, western redcedar, and western hemlock. Sites -- occurs primarily on moist, mid-elevation sites from 1,500 to 4,000 feet.

#### FIR/SPRUCE/MOUNTAIN HEMLOCK GROUP

261 White fir: Associates – Douglas-fir, sugar pine, ponderosa pine, Jeffrey pine, incense-cedar, California red fir, blue spruce, limber pine, and aspen. Sites -- deep well-drained sandy loam-covered slopes and benches with a northerly exposure.

262 Red fir (includes California and Shasta red fir): Associates – Jeffrey pine, western white pine, lodgepole pine, mountain hemlock, and sugar pine. Sites -- found at elevations ranging from 5,400 to 7,500 feet.

263 Noble fir: Associates - Douglas-fir, Pacific silver fir, western and mountain hemlocks, lodgepole pine, western redcedar, and Alaska cedar. Sites -- found on a variety of sites where precipitation is high and snowpacks are common, generally above 3,000 feet in elevation in the Cascade and Coast ranges.

264 Pacific silver fir: Associates - western and mountain hemlocks, western redcedar, Alaska cedar, grand fir, Sitka spruce, lodgepole pine, subalpine fir, and Engelmann spruce. Sites -- most abundant on sites where summer drought is minimal and snowpacks are common, such as areas of heavy rainfall, seepage, or prolonged snowmelt.

265 Engelmann spruce: Associates – western white pine, western redcedar, western hemlock, Douglas-fir, western larch, grand fir, subalpine fir, and lodgepole pine. For this type to be used, the total stocking of Engelmann spruce must be at least 75 percent of the total stocking.

266 Engelmann spruce-subalpine fir: Associates – western white pine, western redcedar, western hemlock, Douglas-fir, western larch, grand fir, and lodgepole pine. Sites -- this type is widespread in the Western U.S. For this type to be used, the sum of the stocking of Engelmann spruce and subalpine fir

must be at least 75 percent of the total stocking and Engelmann spruce stocking must be between 5 and 74 percent of total and subalpine fir stocking must be between 5 and 74 percent of total.

267 Grand fir: Associates – ponderosa pine, Douglas-fir, western hemlock, western redcedar, western white pine, Pacific yew, lodgepole pine, and western larch. Sites -- in Idaho, found on moist slopes from 1,500 to 5,200-foot elevations; in Oregon, it occupies moist low-elevation sites, but also extends up to mid-elevations to as high as 6,000 feet.

268 Subalpine fir: Associates – western white pine, western redcedar, western hemlock, Douglas-fir, western larch, grand fir, Engelmann spruce, and lodgepole pine. For this type to be used, the total stocking of subalpine fir must be at least 75 percent of the total stocking. Sites -- found at high elevations, near timberline.

269 Blue spruce: Associates – Douglas-fir, ponderosa pine, white fir, lodgepole pine, and Rocky Mountain juniper. Sites -- restricted to the southern Rocky Mountains, typically located in the montane zone.

270 Mountain hemlock: Associates – Alaska-cedar, Pacific silver fir, western white pine, lodgepole pine, noble fir, and subalpine fir. Sites -- occurs in cold, moist regions and growing conditions are poor.

271 Alaska-yellow-cedar: Associates: In California, California red fir, Brewer spruce, incense-cedar, Pacific yew, and western white pine; in Oregon and Washington, found with mountain hemlock, subalpine fir, Pacific silver fir, noble fir, western white pine, and western hemlock. Sites -- Cool and humid climate, most stands grow within 100 miles of the Pacific coast.

#### LOGGEPOLE PINE GROUP

281 Lodgepole pine: Associates – subalpine fir, Engelmann spruce, white spruce, Douglas-fir, western redcedar, red alder, and western hemlock. Sites -- one of the most widespread types in the Western U.S. tolerating a broad range of temperature and moisture regimes.

#### HEMLOCK/SITKA SPRUCE GROUP

301 Western hemlock: Associates – Sitka spruce, western redcedar, Douglas-fir, Alaska-yellow-cedar, grand fir, Engelmann spruce, bigleaf maple, and red alder. Sites -- nearly any soil provides a seedbed but requires abundant moisture. Often comes in cut-over or burned-over areas.

304 Western redcedar: Associates – western white pine, western hemlock, western larch, grand fir, Douglas-fir, and Pacific silver fir. Sites -- inhabits moist flats and slopes, the banks of rivers and swamps and can be found in bogs.

305 Sitka spruce: Associates – western hemlock, Douglas-fir, western redcedar, Port Orford-cedar, red alder, bigleaf maple, and black cottonwood. Sites -- limited to a relatively narrow oceanside strip characterized by mild winters, cool summers, and abundant moisture throughout the growing season.

#### WESTERN LARCH GROUP

321 Western larch: Associates – Douglas-fir, subalpine fir, lodgepole pine, Engelmann spruce, western hemlock, and western redcedar. Sites -- best growth on deep, moist, porous soils in high valleys and on mountain slopes of northern and western exposure.

#### REDWOOD GROUP

341 Redwood: Associates – Douglas-fir, grand fir, western hemlock, California torreyia, Pacific yew, and western redcedar. Sites -- largely confined to coastal topography between 35 degrees 41 minutes and 42 degrees 9 minutes north latitude.

342 Giant sequoia: Associates: California white fir, sugar pine, incense-cedar, California red fir, California white fir, ponderosa pine and California black oak. Sites -- Deep, well-drained soils with high soil moisture available during dry summers. Most stands found above 4,000 feet elevation, rarely forming pure stands.

#### OTHER WESTERN SOFWOODS GROUP

361 Knobcone pine: Associates – Digger pine, canyon live oak and many western oaks, Douglas-fir, and Port Orford-cedar. Sites -- found on soils that are shallow, dry, stony or high in magnesium.

362 Southwestern white pine: Associates- Douglas-fir, white fir, ponderosa pine, Gambel oak, and aspen. Sites -- higher elevations in Arizona and New Mexico

363 Bishop pine: Grows singly or in small stands along the coast of California.

364 Monterey pine: Grows singly or in small stands. Sites -- Native stands are found in the high humidity and summer fogs of the central-coast area of California in San Mateo, Santa Cruz, Monterey, and San Luis Obispo Counties.

365 Foxtail pine/bristlecone pine: Associates – limber pine, white fir, Engelmann spruce, ponderosa pine, and pinyon. Sites -- found on rocky outcrops, usually on southern or southwestern exposures and can range in elevation from 8,000 to 11,000 feet.

366 Limber pine: Associates – low to mid elevations.: Douglas-fir, ponderosa pine, Rocky Mountain juniper; mid to high elevations: lodgepole pine and aspen; high elevations: Engelmann spruce, subalpine fir, bristlecone pine, and whitebark pine. Sites -- a very wide range of elevations and latitudes across the Rocky mountains; can be the majority species as an early seral stage under a variety of harsh establishment conditions, as climax in dry, high elevation sites in the central and southern Rockies.

367 Whitebark pine: Associates – subalpine fir, subalpine larch, Engelmann spruce, and lodgepole pine. Sites -- poor, high elevation.

368 Miscellaneous western softwoods: A “catch-all” group for such species as all cypress (Cupressus) species, subalpine larch, Brewer spruce, Apache pine, Chihuahua pine, Washoe pine, Torrey pine, Pacific yew, and California torreyia.

369 Western juniper: Associates – ponderosa pine and Jeffrey pine. Sites -- found on dry sites and ranges in elevation from just above sea level to 6,500 feet.

#### CALIFORNIA MIXED CONIFER GROUP

371 California mixed conifer: Associates - a complex association of ponderosa pine, sugar pine, Douglas-fir, white fir, red fir, and incense-cedar. Generally, five or six conifer species are intermixed either as single trees or in small groups. Sites -- Mixed conifer sites are often on east-facing slopes of the California Coast Range and on the west-facing and higher elevation east-facing slopes of the Oregon Cascades and Sierra Nevadas.

#### EXOTIC SOFTWOODS GROUP

381 Scotch pine: plantation type, not naturally occurring.

383 Other exotic softwoods; Austrian pine

384 Norway spruce: plantation type, not naturally occurring

385 Introduced larch: introduced larch (species code 0070)

#### OTHER SOFTWOODS GROUP

391 Other softwoods: All softwood species identified to genus level only, except cypress, baldcypress, and larch.

#### OAK/PINE GROUP

In these oak/pine forest types, stocking of the pine component needs to be 25-49 percent.

401 Eastern white pine/northern red oak/white ash: Associates – red maple, basswood, yellow birch, bigtooth aspen, sugar maple, beech, paper birch, black cherry, hemlock, and sweet birch. Sites --deep, fertile, well-drained soil.

402 Eastern redcedar/hardwood: Associates – oak, hickory, walnut, ash, locust, dogwood, blackgum, hackberry, winged elm, shortleaf pine, and Virginia pine. Sites -- usually dry uplands and abandoned fields.

403 Longleaf pine/oak: Longleaf pine and scrub oaks--primarily turkey, bluejack, blackjack, and dwarf post oak--comprise the type. Associates--southern scrub oaks in the understory. Sites -- common on sandhills where soils are dry, infertile, and coarse textured. SRS distribution-- coastal plain and piedmont units.

404 Shortleaf pine/oak: Associates - (oaks generally include white, scarlet, blackjack, black, post, and southern red) hickory, blackgum, sweetgum, Virginia pine, and pitch pine. Sites -- generally in dry, low ridges, flats, and south slopes.

405 Virginia pine/southern red oak: Associates – black oak, scarlet oak, white oak, post oak, blackjack oak, shortleaf pine, blackgum, hickory, pitch pine, table-mountain pine, chestnut oak. Sites -- dry slopes and ridges.

406 Loblolly pine/hardwood: Associates – wide variety of moist and wet site hardwoods including blackgum, sweetgum, yellow-poplar, red maple, white and green ash, and American elm; on drier sites associates include southern and northern red oak, white oak, post oak, scarlet oak, persimmon, and hickory. Sites -- usually moist to very moist though not wet all year, but also on drier sites.

407 Slash pine/hardwood: Slash pine and a variable mixture of hardwoods comprise the type. Associates-- codominant with the slash pine component are sweetbay, blackgum, loblolly-bay, pondcypress, pond pine, Atlantic white-cedar, red maple, ash, and water oak. Sites -- undrained or poorly drained depressions such as bays or pocosins and along pond margins. SRS distribution--primarily coastal plain units.

409 Other pine/hardwood: A type used for those unnamed pine-hardwood combinations that meet the requirements for oak-pine. These are stands where hardwoods (usually oaks) comprise the plurality of the stocking with at least a 25 to 49 percent pine, eastern redcedar, or southern redcedar component.

#### OAK/HICKORY GROUP

501 Post oak/blackjack oak (includes dwarf post oak): Associates – black oak, hickory, southern red oak, white oak, scarlet oak, shingle oak, live oak, shortleaf pine, Virginia pine, blackgum, sourwood, red maple, winged elm, hackberry, chinkapin oak, shumard oak, dogwood, and eastern redcedar. Sites -- dry uplands and ridges.

502 Chestnut oak: Associates – scarlet oak, white oak, black oak, post oak, pitch pine, blackgum, sweetgum, red maple, red oak, shortleaf pine, Virginia pine. Sites -- rocky outcrops with thin soil, ridge tops.

503 White oak/red oak/hickory (includes all hickories except water and shellbark hickory): Associates – pin oak, northern pin oak, chinkapin oak, black oak, dwarf chinkapin oak, American elm, scarlet oak, bur oak, white ash, sugar maple, red maple, walnut, basswood, locust, beech, sweetgum, blackgum, yellow-poplar, and dogwood. Sites -- wide variety of well-drained upland soils.

504 White oak: Associates – black oak, northern red oak, bur oak, hickory, white ash, yellow-poplar. Sites -- scattered patches on upland, loamy soils but on drier sites than type 503.

505 Northern red oak: Associates – black oak, scarlet oak, chestnut oak, and yellow-poplar. Sites --spotty distribution on ridge crests and north slopes in mountains but also found on rolling land, slopes, and benches on loamy soil.

506 Yellow-poplar/white oak/northern red oak: Associates – black oak, hemlock, blackgum, and hickory. Sites -- northern slopes, coves, and moist flats.

- 507 Sassafras/persimmon: Associates – elm, eastern redcedar, hickory, ash, sugar maple, yellow-poplar, Texas sophora, and oaks. Sites -- abandoned farmlands and old fields.
- 508 Sweetgum/yellow-poplar: Associates – red maple, white ash, green ash, and other moist site hardwoods. Sites -- generally occupies moist, lower slopes.
- 509 Bur oak: Associates—northern pin oak, black oak, chinkapin oak, and eastern redcedar in northern and dry upland sites; shagbark hickory, black walnut, eastern cottonwood, white ash, American elm, swamp white oak, honey locust, and American basswood in southern and lowland sites. Sites -- drier uplands to moist bottomlands with the drier uplands more common in the northern part of the range and the moist bottomlands more common in the southern part of the range.
- 510 Scarlet oak: Associates – black oak, southern red oak, chestnut oak, white oak, post oak, hickory, pitch pine, blackgum, sweetgum, black locust, sourwood, dogwood, shortleaf pine, and Virginia pine. Sites -- dry ridges, south- or west-facing slopes and flats but often moister situations probably as a result of logging or fire.
- 511 Yellow-poplar: Associates – black locust, red maple, sweet birch, cucumbertree, and other moist-site hardwoods (except sweetgum, see type 508) and white oak and northern red oak (see type 503). Sites -- lower slopes, northerly slopes, moist coves, flats, and old fields.
- 512: Black walnut: Associates – yellow-poplar, white ash, black cherry, basswood, beech, sugar maple, oaks, and hickory. Sites -- coves and well-drained bottoms.
- 513 Black locust: Associates – many species of hardwoods and hard pines may occur with it in mixture, either having been planted or from natural seeding. Sites -- may occur on any well-drained soil but best on dry sites, often in old fields.
- 514 Southern scrub oak: This forest cover type consists of a mixture of scrub oaks that may include several of the following species: turkey oak, bluejack oak, dwarf live oak, Durand oak, and bear oak (otherwise known as scrub oak). Also includes anacahuita. Sites -- dry sandy ridges—the type frequently develops on areas formerly occupied by longleaf pine. SRS distribution--common throughout all coastal plain units and into the lower Piedmont.
- 515 Chestnut oak/black oak/scarlet oak: Associates—northern and southern red oaks, post oak, white oak, sourwood, shagbark hickory, pignut hickory, yellow-poplar, blackgum, sweetgum, red maple, eastern white pine, pitch pine, Table Mountain pine, shortleaf pine, and Virginia pine. Sites --dry upland sites on thin-soiled rocky outcrops on dry ridges and slopes.
- 516 Cherry/white ash/yellow-poplar: Associates – sugar maple, American beech, northern red oak, white oak, blackgum, hickory, cucumbertree, and yellow birch. Sites -- fertile, moist, well-drained sites.
- 517 Elm/ash/black locust: Associates – Black locust, silver maple, boxelder, blackbead ebony, American elm, slippery elm, rock elm, red maple, green ash predominate. Found in North Central region, unknown in Northeast. Sites -- upland.
- 519 Red maple/oak: Associates – the type is dominated by red maple and some of the wide variety of central hardwood associates include upland oak, hickory, yellow-poplar, black locust, sassafras as well as some central softwoods like Virginia and shortleaf pines. Sites -- uplands.
- 520 Mixed upland hardwoods: Includes Ohio buckeye, yellow buckeye, Texas buckeye, red buckeye, painted buckeye, American hornbeam, American chestnut, eastern redbud, flowering dogwood, hawthorn spp., cockspur hawthorn, downy hawthorn, Washington hawthorn, fleshy hawthorn, dwarf hawthorn, honeylocust, Kentucky coffeetree, Osage-orange, all mulberries, blackgum, sourwood, southern red oak, shingle oak, laurel oak, water oak, live oak, willow oak, black locust, blackbead ebony, anacahuita, and September elm. Associates – Any mixture of hardwoods of species typical of the upland central hardwood region, should include at least some oak. Sites--wide variety of upland sites.

#### OAK/GUM/CYPRESS GROUP

601 Swamp chestnut oak/cherrybark oak: Associates – Shumard oak, Delta post oak, white ash, hickory, white oak, blackgum, sweetgum, southern red oak, post oak, American elm, winged elm, yellow-poplar, and beech. Sites -- within alluvial flood plains of major rivers, on all ridges in the terraces, and on the best fine sandy loam soils on the highest first bottom ridges.

602 Sweetgum/Nuttall oak/willow oak: Associates – American holly, green ash, American elm, pecan, cottonwood, red maple, honeylocust, persimmon, anacahuita. Sites -- very wet.

605 Overcup oak/water hickory (includes shellbark hickory): Associates – pin oak, willow oak, American elm, green ash, hackberry, persimmon, and red maple. Sites -- in South within alluvial flood plains in low, poorly drained flats with clay soils; also in sloughs and lowest backwater basins and low ridges with heavy soils that are subject to late spring inundation.

606 Atlantic white-cedar: Associates – North includes gray birch, pitch pine, hemlock, blackgum, and red maple. South includes pond pine, baldcypress, and red maple. Sites -- usually confined to sandy-bottomed, peaty, interior, and river swamps, wet depressions, and stream banks.

607 Baldcypress/water tupelo: 25-50 percent stocking of baldcypress (either baldcypress or Montezuma baldcypress). Associates – blackgum, willow, red maple, American elm, persimmon, overcup oak, and sweetgum. Sites -- very low, poorly drained flats, deep sloughs, and swamps; wet most all the year. Also, floodplains and stream margins.

608 Sweetbay/swamp tupelo/red maple: Associates – blackgum, Florida maple, water birch, gum bumelia, waterlocust, loblolly bay, all magnolias, red maple, Ogechee tupelo, red bay, water-elm, Oglethorpe oak, loblolly and pond pines, American elm, and other moist-site hardwoods. Sites -- very moist but seldom wet all year--shallow ponds, muck swamps, along smaller creeks in Coastal Plain (rare in Northeast).

609 Baldcypress/pondcypress: > 50 percent stocking of baldcypress and/or pondcypress. Associates – blackgum, willow, red maple, American elm, persimmon, overcup oak, and sweetgum. Sites -- very low, poorly drained flats, deep sloughs, and swamps; wet most all the year. Also, floodplains and stream margins.

#### ELM/ASH/COTTONWOOD GROUP

701 Black ash/American elm/red maple (includes slippery and rock elm): Associates – swamp white oak, silver maple, sycamore, pin oak, blackgum, white ash, and cottonwood. Sites -- moist to wet areas, swamps, gullies, and poorly drained flats.

702 River birch/sycamore: Associates – red maple, black willow, and other moist-site hardwoods. Sites -- moist soils at edges of creeks and rivers.

703 Cottonwood: Associates – willow, white ash, green ash, and sycamore. Sites -- streambanks where bare, moist soil is available.

704 Willow (includes peachleaf and black willow): Associates – cottonwood, green ash, sycamore, pecan, American elm, red maple, and boxelder. Sites -- streambanks where bare, moist soil is available.

705 Sycamore/pecan/American elm (includes slippery and rock elm): Associates – sweetgum, green ash, hackberry, silver maple, cottonwood, willow, boxelder, and river birch. Sites -- bottomlands, alluvial flood plains of major rivers.

706 Sugarberry/hackberry/elm/green ash (includes American, winged, cedar, slippery and rock elm): Associates – boxelder, pecan, blackgum, persimmon, honeylocust, red maple, hackberry, and boxelder. Sites -- low ridges and flats in flood plains.

707 Silver maple/American elm: Silver maple and American elm are the majority species in this type. Associates – chalk maple, sweetgum, pin oak, swamp white oak, eastern cottonwood, sycamore, green ash, and other moist-site hardwoods, according to the region. Sites -- primarily on well-drained moist sites along river bottoms and floodplains, and beside lakes and larger streams.

708 Red maple/lowland: Red maple comprises a majority of the stocking. Because this type grows on a wide variety of sites over an extensive range, associates are diverse. Associates include yellow-poplar, blackgum, sweetgum, and loblolly pine. Site -- generally restricted to very moist to wet sites with poorly drained soils, and on swamp borders.

709 Cottonwood/willow (includes peachleaf, black and Bebb willow): Associates -- white ash, green ash, sycamore, American elm, red maple and boxelder. Sites -- stream banks where bare, moist soil is available.

722 Oregon ash: Associates - red alder, bigleaf maple, black cottonwood, willow. Sites -- riparian areas, prefers damp, loose soils, below 3000 feet.

#### MAPLE/BEECH/BIRCH GROUP

801 Sugar maple/beech/yellow birch: Associates -- butternut, basswood, red maple, hemlock, northern red oak, white ash, white pine, black cherry, sweet birch, American elm, rock elm, and eastern hophornbeam. Sites -- fertile, moist, well-drained sites.

802 Black cherry: Associates -- sugar maple, northern red oak, red maple, white ash, basswood, sweet birch, butternut, American elm, and hemlock. Sites -- fertile, moist, well-drained sites.

803 Cherry/ash/yellow-poplar: Retired -- see code 516

805 Hard maple/basswood (includes American, Carolina, and white basswood): Associates -- black maple, white ash, northern red oak, eastern hophornbeam, American elm, red maple, eastern white pine, eastern hemlock. Sugar maple and basswood occur in different proportions but together comprise the majority of the stocking. Sites -- fertile, moist, well-drained sites.

807 Elm/ash/locust: Retired -- see code 517

809 Red maple/upland: Associates -- the type is dominated by red maple and some of the wide variety of northern hardwood associates include sugar maple, beech, birch, aspen, as well as some northern softwoods like white pine, red pine, and hemlock; this type is often the result of repeated disturbance or cutting. Sites -- uplands. (See Type 519 under oak/hickory group)

#### ASPEN/BIRCH GROUP

901 Aspen: Associates -- Engelmann spruce, lodgepole pine, ponderosa pine, Douglas-fir, subalpine fir, white fir, white spruce, balsam poplar, and paper birch. Sites -- aspen has the capacity to grow on a variety of sites and soils, ranging from shallow stony soils and loamy sands to heavy clays.

902 Paper birch (includes northern paper birch): Associates -- aspen, white spruce, black spruce, and lodgepole pine. Sites -- can be found on a range of soils, but best developed on well-drained sandy loam and silt loam soils.

903 Gray birch: Associates -- oaks, red maple, white pine, and others. Sites -- poor soils of abandoned farms and burns.

904 Balsam poplar: Associates -- paper birch, white spruce, black spruce, and tamarack. Sites -- occurs on rich floodplains where erosion and folding are active.

905 Pin cherry: Associates -- quaking and bigtooth aspen; paper and yellow birch; striped, red and sugar maple; beech; northern red oak; balsam fir; and red spruce. In the Appalachians, Fraser fir and mountain-ash are additional associates. In the central and Lake states, chokecherry and black cherry are common. Sites -- Occurs over a wide range of soils and drainage classes, found on sites varying from dry rocky ledges and sandy plains to moist loamy soils.

#### ALDER/MAPLE GROUP

911 Red alder: Associates - Douglas-fir, western hemlock, western redcedar, grand fir, Sitka spruce, black cottonwood, bigleaf maple, willow. Sites -- stream bottoms and lower slopes, west of the Cascades, usually within 125 miles of the coast, below 2,400 feet.

912 Bigleaf maple: Associates - Douglas-fir, western hemlock, western redcedar, black cottonwood, Pacific madrone, Pacific dogwood, red alder. Sites -- Flat interior valleys, gently sloping stream bottoms, and moderate to steep slopes; favors moist, well-drained soils of river terraces and flood plains, but also grows on drier rocky, south-facing slopes in the Coast Ranges of northwestern Oregon.

## WESTERN OAK GROUP

921 Gray pine: Associates - Blue oak, California black oak, interior live oak, coast live oak, valley oak, California scrub oak, buckeye, western juniper, Coulter pine. Sites -- dry foothill woodland communities of California's Central Valley, on rocky slopes and steep canyon walls below 3,000 feet. Prefers areas with hot, dry summers and absence of summer fog. Tolerates infertile, low moisture soils.

922 California black oak: Associates -- ponderosa pine, Douglas-fir, incense-cedar, knobcone pine, Pacific madrone, tanoak, and Oregon white oak.

923 Oregon white oak: Associates -- Douglas-fir, bigleaf maple, and Oregon ash. Sites -- commonly occurs in very moist locations, in mixture with Oregon ash on floodplains of the Willamette Valley, and on poorly drained heavy clay soils.

924 Blue oak: Associates -- Gray pine, interior live oak, canyon live oak, valley oak, and California buckeye. Sites -- low valleys and foothills of the Coast Ranges and Sierras in California.

**925 Deciduous oak woodland: Retired -- see code 971 (deciduous oak woodland) or 935 (California white oak).**

**926 Evergreen oak woodland: Retired -- see code 972.**

931 Coast live oak: Associates -- knobcone pine, Monterey pine, interior live oak, valley oak, blue oak, tanoak, Pacific madrone, and California laurel. Sites -- usually occupies well-drained soils.

932 Canyon live oak/interior live oak: Retired -- see codes 933 or 934.

933 Canyon live oak: Associates -- Douglas-fir, bigcone Douglas-fir, ponderosa pine, Jeffrey pine, bigleaf maple, Pacific madrone, and California laurel. Sites -- found on steep rocky canyon slopes and boulder-filled bottoms.

934 Interior live oak: Associates - Blue oak, coast live oak, valley oak, canyon live oak, gray pine, ponderosa pine, Douglas-fir. Sites -- from valleys to foothills, below 5,000 feet; grows on moister sites than blue oak.

935 California white oak (valley oak): Associates - Canyon live oak, coast live oak, California black oak, blue oak, California buckeye, gray pine, ponderosa pine. Sites -- hot interior valleys and slopes below 2,000 feet; tolerates cool wet winters and hot dry summers; prefers fertile soils of valley floors.

## TANOAK/LAUREL GROUP

941 Tanoak: Associates -- Douglas-fir, Pacific madrone, and canyon live oak. Sites -- sea level to 5,000 feet elevation from southern Oregon south along the Coast Ranges to the Santa Ynez Mountains in California.

942 California laurel: Associates - usually found in mixed stands with a wide variety of associated species. Sites -- from the cool, humid conditions of dense coastal forests to hot, dry sites found inland in open woodlands and chaparral, below 4,000 feet.

943 Giant chinkapin: Associates - rarely grows in pure stands, usually a component of other types. Found with Douglas-fir, western hemlock, incense-cedar, white fir, western white pine, sugar pine, ponderosa

pine, Pacific madrone, tanoak, and California black oak. Sites -- from valley bottoms to ridgetops, in the coast and cascade ranges, below 5,000 feet. Tolerates infertile and droughty sites.

#### OTHER WESTERN HARDWOODS GROUP – entire group retired.

951 Pacific madrone: Retired – see code 961.

952 Mesquite woodland: Retired – see code 973.

953 Cercocarpus woodland: Retired – see code 974.

954 Intermountain maple woodland: Retired – see code 975

955 Miscellaneous western hardwood woodlands: Retired – see code 976.

#### OTHER HARDWOODS GROUP

961 Pacific madrone: Associates - a wide variety of species, but most common with Douglas-fir and tanoak. Sites -- grows on all aspects but is found most often on those facing south and west, and tolerates low soil moisture in summer

962 Other hardwoods: A “catch-all” group for any of the following, especially where on a mapped subplot, only one or two trees of a single “odd-ball” species is tallied. Includes all hardwood species identified to the genus level only except hackberry spp., hawthorn spp., eucalyptus spp., persimmon spp., magnolia spp., mulberry spp., mesquite spp., citrus spp., royal palm spp., willow spp., and saltcedar spp., AND striped maple, mountain maple, California buckeye, Arizona alder, serviceberry, Arizona madrone, pawpaw, sweet birch, Virginia roundleaf birch, Allegheny chinkapin, Ozark chinkapin, southern catalpa, northern catalpa, yellowwood, Pacific dogwood, pumpkin ash, blue ash, velvet ash, Carolina ash, Texas ash, all silverbells, California black walnut, southern California black walnut, Texas walnut, Arizona walnut, all apple species, eastern hophornbeam, California sycamore, Arizona sycamore, chokecherry, peach, Canada plum, wild plum, bitter cherry, Allegheny plum, Chickasaw plum, sweet cherry, sour cherry, European plum, Mahaleb plum, western soapberry, American mountain-ash, northern mountain-ash, Joshua tree, smoketree, great leucaena, and berlandier ash.

#### WOODLAND HARDWOODS GROUP

971 Deciduous oak woodland: areas with predominantly Gambel oak, which is often associated with ponderosa pine, white fir, Douglas-fir, alligator juniper, bigtooth maple, and chokecherry. Sites -- most soils, on elevations generally ranging from 4,000 to 8,000 feet.

972 Evergreen oak woodland: areas with predominantly evergreen oaks, such as Arizona white oak, Emory oak, Engelmann oak, Mexican blue oak, silverleaf oak, gray oak and/or netleaf oak. Other associates – various pinyons and junipers. Sites -- alluvial soils, from 4,000 to 7,500 feet elevation.

973 Mesquite woodland: Honey mesquite and screwbean mesquite comprise the majority of the stocking of this cover type. Honey mesquite associates, which are many, vary with climate and soils. Sites -- occurs on a wide variety of soils at elevations mostly below 5,000 feet.

974 Cercocarpus (Mountain brush) woodland (includes curlleaf mountain-mahogany): Associates - Rocky Mountain juniper, big sagebrush, and snowberry. Sites -- dry, course-textured soils.

975 Intermountain maple woodland (includes Rocky Mountain and/or bigtooth maple): Associates - chokecherry, boxelder, birchleaf mountain-mahogany, and Gambel oak. Sites -- most soils but does not tolerate long flooding periods. Found growing between 4,500 and 7,500 feet elevation.

976 Miscellaneous woodland hardwoods [includes acacia, New Mexico locust, and/or Arizona ironwood (tesota)]. Sites – occurs on a wide variety of soils at elevations mostly below 5,000 feet.

#### TROPICAL HARDWOODS GROUP

981 Sabal palm: Retired – sabal palm is no longer tallied as a tree. See code 983 or 962.

982 Mangrove: Forests in which mangrove comprises a majority of the stocking. Associates--cabbage palm on some of the higher sites in the area. Sites -- predominantly salt marshes; mangrove frequently develops its own island or shoreline made up of a dense mat of root structures. SRS distribution--restricted to South Florida and the Keys.

983 Palms: Includes paurotia-palm, silver palm, coconut palm, royal palm spp., cabbage palmetto, Mexican palmetto, key thatch palm, Florida thatch palm, and other palms. Associates – Sand live oak, slash pine, live oak, laurel oak, water oak, baldcypress, southern magnolia, red maple, redbay, swamp tupelo, sweetgum, southern redcedar, and loblolly pine. In extreme southern Florida, tropical hardwoods replace temperate hardwoods as associates. Sites -- can tolerate a broad range of soil pH, salinity, and drainage.

989 Other tropical hardwoods: This type consists of dense forests of hardwood trees and palms. Includes gumbo-limbo, tamarind, poisonwood, pigeon-plum, torchwood, willow bastic, false mastic, pond apple, sheoak, gray sheoak, river sheoak, camphor tree, fiddlewood, citrus spp., soldierwood, Geiger tree, carrotwood, red stopper, inkwood, strangler fig, shortleaf fig, blolly, manchineel, paradise tree, Java plum, false tamarind, mango, fishpoison tree, and octopus tree. Associates –black ironwood (leadwood), lancewood, and mastic as well as more temperate live oak and red bay. Sites -- Occurs on land slightly higher than surrounding fresh and saltwater marshes or on pine land.

#### EXOTIC HARDWOODS GROUP

991 Paulownia: Stands with the majority of stocking comprised of *Paulownia tomentosa*, commonly known as Princess tree, royal paulownia or empress tree. Sites -- can be found along roadsides, streambanks, and forest edges. It tolerates infertile and acid soils and drought conditions. It easily adapts to disturbed habitats, including previously burned areas, forests defoliated by pests (such as the gypsy moth) and landslides and can colonize rocky cliffs and scoured riparian zones. Paulownia can also be found in plantations.

992 Melaleuca: Stands with the majority of stocking comprised of melaleuca (*Melaleuca quinquenervia*). Melaleuca trees, also known as punk trees or paperbark tea trees, are native to Australia. Sites -- In the gulf-coastal plain, it is found in swamps and glades, often eliminating all other forms of vegetation

993 Eucalyptus: Associates - As an introduced and naturalized species, it has few common associates. Usually planted as an ornamental, in plantations for firewood, or along roads and parks for cover. Sites -- good drainage, low salinity, mild temperate climates.

995 Other exotic hardwoods: Includes any of the following species: Norway maple, ailanthus, mimosa, European alder, Chinese chestnut, ginkgo, Lombardy poplar, European mountain-ash, West Indian mahogany, Siberian elm, saltcedar spp., chinaberry, Chinese tallowtree, tung-oil-tree, Russian-olive, and avocado.

For nonstocked stands, see sections 2.5.3 for procedures to determine FOREST TYPE.



### Appendix 3. FIA Tree Species Codes

A. This list includes all tree species tallied in the Continental U.S. and Alaska. Species designated East/West are commonly found in those regions, although species designated for one region may occasionally be found in another. Woodland species designate species where DRC is measured instead of DBH. Species that have an "X" in the *Core* column are tallied in all regions. All other species on the list are "core optional".

Core	East	West	Wood-land	FIA Code	PLANTS Code	Common Name	Genus	Species
	E	W		0010	ABIES	Fir spp.	Abies	spp.
X		W		0011	ABAM	Pacific silver fir	Abies	amabilis
X	E	W		0012	ABBA	balsam fir	Abies	balsamea
X		W		0014	ABBR	Santa Lucia fir, bristlecone fir	Abies	bracteata
X		W		0015	ABCO	white fir	Abies	concolor
X	E			0016	ABFR	Fraser fir	Abies	fraseri
X		W		0017	ABGR	grand fir	Abies	grandis
X		W		0018	ABLAA	corkbark fir	Abies	lasiocarpa var. arizonica
X		W		0019	ABLA	subalpine fir	Abies	lasiocarpa
X		W		0020	ABMA	California red fir	Abies	magnifica
X		W		0021	ABSH	Shasta red fir	Abies	shastensis
X		W		0022	ABPR	noble fir	Abies	procera
	E	W		0040	CHAMA4	cedar spp.	Chamaecyparis	spp.
X		W		0041	CHLA	Port-Orford-cedar	Chamaecyparis	lawsoniana
X		W		0042	CHNO	Alaska yellow-cedar	Chamaecyparis	nootkatensis
X	E			0043	CHTH2	Atlantic white-cedar	Chamaecyparis	thyoides
		W		0050	CUPRE	cypress	Cupressus	spp.
X		W		0051	CUAR	Arizona cypress	Cupressus	arizonica
X		W		0052	CUBA	Baker cypress, Modoc cypress	Cupressus	bakeri
X		W		0053	CUFO2	tecate cypress	Cupressus	forbesii
X		W		0054	CUMA2	Monterey cypress	Cupressus	macrocarpa
		W		0055	CUSA3	Sargent's cypress	Cupressus	sargentii
X		W		0056	CUMA	MacNab's cypress	Cupressus	macnabiana
	E	W		0057	JUNIP	redcedar, juniper spp.	Juniperus	spp.
X		W	w	0058	JUPI	Pinchot juniper	Juniperus	pinchotii
X		W	w	0059	JUCO11	redberry juniper	Juniperus	coahuilensis
	E		w	0060	JUFL	drooping juniper	Juniperus	flaccida
X	E		w	0061	JUAS	Ashe juniper	Juniperus	ashei
X		W	w	0062	JUCA7	California juniper	Juniperus	californica
X		W	w	0063	JUDE2	alligator juniper	Juniperus	deppeana
X		W		0064	JUOC	western juniper	Juniperus	occidentalis
X		W	w	0065	JUOS	Utah juniper	Juniperus	osteosperma
X	E	W	w	0066	JUSC2	Rocky Mountain juniper	Juniperus	scopulorum
	E			0067	JUVIS	southern redcedar	Juniperus	virginiana var. silicicola
X	E			0068	JUVI	eastern redcedar	Juniperus	virginiana
X		W	w	0069	JUMO	oneseed juniper	Juniperus	monosperma
	E	W		0070	LARIX	larch spp.	Larix	spp.
X	E	W		0071	LALA	tamarack (native)	Larix	laricina
X		W		0072	LALY	subalpine larch	Larix	lyallii
X		W		0073	LAOC	western larch	Larix	occidentalis
X		W		0081	CADE27	incense-cedar	Calocedrus	decurrens
	E	W		0090	PICEA	spruce spp.	Picea	spp.
X	E			0091	PIAB	Norway spruce	Picea	abies
X		W		0092	PIBR	Brewer spruce	Picea	breweriana
X		W		0093	PIEN	Engelmann spruce	Picea	engelmannii

Core	East	West	Wood-land	FIA Code	PLANTS Code	Common Name	Genus	Species
X	E	W		0094	PIGL	white spruce	Picea	glauca
X	E	W		0095	PIMA	black spruce	Picea	mariana
X	E	W		0096	PIPU	blue spruce	Picea	pungens
X	E			0097	PIRU	red spruce	Picea	rubens
X		W		0098	PISI	Sitka spruce	Picea	sitchensis
	E	W		0100	PINUS	pine spp.	Pinus	spp.
X		W		0101	PIAL	whitebark pine	Pinus	albicaulis
X		W		0102	PIAR	Rocky Mountain bristlecone pine	Pinus	aristata
X		W		0103	PIAT	knobcone pine	Pinus	attenuata
X		W		0104	PIBA	foxtail pine	Pinus	balfouriana
X	E			0105	PIBA2	jack pine	Pinus	banksiana
X		W	w	0106	PIED	Common pinyon, two-needle pinyon	Pinus	edulis
X	E			0107	PICL	sand pine	Pinus	clausa
X		W		0108	PICO	lodgepole pine	Pinus	contorta
X		W		0109	PICO3	Coulter pine	Pinus	coulteri
X	E			0110	PIEC2	shortleaf pine	Pinus	echinata
X	E			0111	PIEL	slash pine	Pinus	elliottii
X		W		0112	PIEN2	Apache pine	Pinus	engelmannii
X		W		0113	PIFL2	limber pine	Pinus	flexilis
X		W		0114	PIST3	southwestern white pine	Pinus	strobiformis
X	E			0115	PIGL2	spruce pine	Pinus	glabra
X		W		0116	PIJE	Jeffrey pine	Pinus	jeffreyi
X		W		0117	PILA	sugar pine	Pinus	lambertiana
X		W		0118	PILE	Chihuahua pine	Pinus	leiophylla
X		W		0119	PIMO3	western white pine	Pinus	monticola
X		W		0120	PIMU	bishop pine	Pinus	muricata
X	E			0121	PIPA2	longleaf pine	Pinus	palustris
X	E	W		0122	PIPO	ponderosa pine	Pinus	ponderosa
X	E			0123	PIPU5	Table Mountain pine	Pinus	pungens
X		W		0124	PIRA2	Monterey pine	Pinus	radiata
X	E			0125	PIRE	red pine	Pinus	resinosa
X	E			0126	PIRI	pitch pine	Pinus	rigida
X		W		0127	PISA2	gray pine, California foothill pine	Pinus	sabiniana
X	E			0128	PISE	pond pine	Pinus	serotina
X	E			0129	PIST	eastern white pine	Pinus	strobus
X	E			0130	PISY	Scotch pine	Pinus	sylvestris
X	E			0131	PITA	loblolly pine	Pinus	taeda
X	E			0132	PIV2	Virginia pine	Pinus	virginiana
X		W	w	0133	PIMO	singleleaf pinyon	Pinus	monophylla
X		W	w	0134	PID3	border pinyon	Pinus	discolor
X		W		0135	PIAR5	Arizona pine	Pinus	arizonica
X	E			0136	PINI	Austrian pine	Pinus	nigra
X		W		0137	PIWA	Washoe pine	Pinus	washoensis
X		W		0138	PIQU	four-leaf pine, Parry pinyon pine	Pinus	quadrifolia
X		W		0139	PITO	Torrey pine	Pinus	torreyana
X		W	w	0140	PICE	Mexican pinyon pine	Pinus	cembroides
	E		w	0141	PIRE5	papershell pinyon pine	Pinus	remota
X		W		0142	PILO	Great Basin bristlecone pine	Pinus	longaeva
X		W	w	0143	PIMOF	Arizona pinyon pine	Pinus	monophylla var. fallax
X	E			0144	PIELE2	Caribbean pine	Pinus	elliottii var. elliottii
		W		0200	PSEUD7	Douglas-fir spp.	Pseudotsuga	spp.
X		W		0201	PSMA	bigcone Douglas-fir	Pseudotsuga	macrocarpa

Core	East	West	Wood-land	FIA Code	PLANTS Code	Common Name	Genus	Species
X		W		0202	PSME	Douglas-fir	Pseudotsuga	menziesii
X		W		0211	SESE3	redwood	Sequoia	sempervirens
X		W		0212	SEGI2	giant sequoia	Sequoiadendron	giganteum
	E			0220	TAXOD	cypress spp.	Taxodium	spp.
X	E			0221	TADI2	baldcypress	Taxodium	distichum
X	E			0222	TAAS	pondecypress	Taxodium	ascendens
	E			0223	TAMU	Montezuma baldcypress	Taxodium	mucronatum
	E	W		0230	TAXUS	yew spp.	Taxus	spp.
		W		0231	TABR2	Pacific yew	Taxus	brevifolia
X	E			0232	T AFL	Florida yew	Taxus	floridana
	E	W		0240	THUJA	Thuja spp.	Thuja	spp.
X	E			0241	THOC2	northern white-cedar	Thuja	occidentalis
X		W		0242	THPL	western redcedar	Thuja	plicata
	E	W		0250	TORRE	torreya (nutmeg) spp.	Torreya	spp.
X		W		0251	TOCA	California torreya (nutmeg)	Torreya	californica
X	E			0252	TOTA	Florida torreya (nutmeg)	Torreya	taxifolia
	E	W		0260	TSUGA	hemlock spp.	Tsuga	spp.
X	E			0261	TSCA	eastern hemlock	Tsuga	canadensis
X	E			0262	TSCA2	Carolina hemlock	Tsuga	caroliniana
X		W		0263	TSHE	western hemlock	Tsuga	heterophylla
X		W		0264	TSME	mountain hemlock	Tsuga	mertensiana
X	E	W		0299	2TE	unknown dead conifer	Tree	evergreen
	E	W	w	0300	ACAC1	acacia spp.	Acacia	spp.
	E	W		0303	ACFA	sweet acacia	Acacia	farnesiana
	E	W		0304	ACGR	catclaw acacia	Acacia	greggii
	E	W		0310	ACER	maple spp.	Acer	spp.
X	E			0311	ACBA3	Florida maple	Acer	barbatum
X		W		0312	ACMA3	bigleaf maple	Acer	macrophyllum
X	E	W		0313	ACNE2	boxelder	Acer	negundo
X	E			0314	ACN15	black maple	Acer	nigrum
X	E			0315	ACPE	striped maple	Acer	pensylvanicum
X	E			0316	ACRU	red maple	Acer	rubrum
X	E			0317	ACSA2	silver maple	Acer	saccharinum
X	E			0318	ACSA3	sugar maple	Acer	saccharum
	E			0319	ACSP2	mountain maple	Acer	spicatum
	E			0320	ACPL	Norway maple	Acer	platanoides
		W	w	0321	ACGL	Rocky Mountain maple	Acer	glabrum
		W	w	0322	ACGR3	bigtooth maple	Acer	grandidentatum
X	E			0323	ACLE	chalk maple	Acer	leucoderme
	E	W		0330	AESCU	buckeye, horsechestnut spp.	Aesculus	spp.
X	E			0331	A EGL	Ohio buckeye	Aesculus	glabra
X	E			0332	A EFL	yellow buckeye	Aesculus	flava
		W		0333	A ECA	California buckeye	Aesculus	californica
	E			0334	A EGLA	Texas buckeye	Aesculus	glabra var. arguta
	E			0336	A EPA	red buckeye	Aesculus	pavia
X	E			0337	A ESY	painted buckeye	Aesculus	sylvatica
X	E			0341	A IAL	ailanthus	Ailanthus	altissima
X	E	W		0345	ALJU	mimosa/silktree	Albizia	julibrissin
		W		0350	ALNUS	alder spp.	Alnus	spp.
X		W		0351	ALRU2	red alder	Alnus	rubra
X		W		0352	ALRH2	white alder	Alnus	rhombofolia
X		W		0353	ALOB2	Arizona alder	Alnus	oblongifolia
X	E			0355	ALGL2	European alder	Alnus	glutinosa

Core	East	West	Wood-land	FIA Code	PLANTS Code	Common Name	Genus	Species
	E	W		0356	AMELA	serviceberry spp.	Amelanchier	spp.
	E	W		0357	AMAR3	common serviceberry	Amelanchier	arborea
	E	W		0358	AMSA	roundleaf serviceberry	Amelanchier	sanguinea
		W		0360	ARBUT	Madrone spp.	Arbutus	spp.
X		W		0361	ARME	Pacific madrone	Arbutus	menziesii
X		W		0362	ARAR2	Arizona madrone	Arbutus	arizonica
	E	W	w	0363	ARXA80	Texas madrone	Arbutus	xalapensis
X	E			0367	ASTR	Pawpaw	Asimina	triloba
	E	W		0370	BETUL	birch spp.	Betula	spp.
X	E			0371	BEAL2	yellow birch	Betula	alleghaniensis
X	E			0372	BELE	sweet birch	Betula	lenta
X	E			0373	BENI	river birch	Betula	nigra
X	E			0374	BEOC2	water birch	Betula	occidentalis
X	E	W		0375	BEPA	paper birch	Betula	papyrifera
X	E			0377	BEUB	Virginia roundleaf birch	Betula	uber
X		W		0378	BEUT	northwestern paper birch	Betula	X utahensis
X	E			0379	BEPO	gray birch	Betula	populifolia
	E			0381	SILAL3	Chittamwood, gum bumelia	Sideroxylon	lanuginosum ssp. lanuginosum
X	E			0391	CACA18	American hornbeam, musclewood	Carpinus	caroliniana
	E			0400	CARYA	hickory spp.	Carya	spp.
X	E			0401	CAAQ2	water hickory	Carya	aquatica
X	E			0402	CACO15	bitternut hickory	Carya	cordiformis
X	E			0403	CAGL8	pignut hickory	Carya	glabra
X	E			0404	CAIL2	pecan	Carya	illinoensis
X	E			0405	CALA21	shellbark hickory	Carya	laciniosa
X	E			0406	CAMY	nutmeg hickory	Carya	myristiciformis
X	E			0407	CAOV2	shagbark hickory	Carya	ovata
X	E			0408	CATE9	black hickory	Carya	texana
X	E			0409	CAAL27	mockernut hickory	Carya	alba
X	E			0410	CAPA24	sand hickory	Carya	pallida
X	E			0411	CAFL6	scrub hickory	Carya	floridana
X	E			0412	CAOV3	red hickory	Carya	ovalis
X	E			0413	CACA38	southern shagbark hickory	Carya	carolinae-septentrionalis
	E	W		0420	CASTA	chestnut spp.	Castanea	spp.
	E			0421	CADE12	American chestnut	Castanea	dentata
X	E			0422	CAPU9	Allegheny chinkapin	Castanea	pumila
	E			0423	CAPUO	Ozark chinkapin	Castanea	pumila var. ozarkensis
X	E	W		0424	CAMO83	Chinese chestnut	Castanea	mollissima
		W		0431	CHCHC4	giant chinkapin, golden chinkapin	Chrysolepis	chrysophylla var. chrysophylla
	E			0450	CATAL	catalpa spp.	Catalpa	spp.
X	E			0451	CABI8	southern catalpa	Catalpa	bignonioides
X	E			0452	CASP8	northern catalpa	Catalpa	speciosa
	E	W		0460	CELT1	hackberry spp.	Celtis	spp.
X	E	W		0461	CELA	sugarberry	Celtis	laevigata
X	E	W		0462	GEOC	hackberry	Celtis	occidentalis
	E	W		0463	CELAR	netleaf hackberry	Celtis	laevigata var. reticulata
X	E			0471	CECA4	eastern redbud	Cercis	canadensis
		W	w	0475	CELE3	curlleaf mountain-mahogany	Cercocarpus	ledifolius
X	E			0481	CLKE	yellowwood	Cladrastis	kentukea
	E	W		0490	CORNU	dogwood spp.	Cornus	spp.
X	E			0491	COFL2	flowering dogwood	Cornus	florida
X		W		0492	CONU4	Pacific dogwood	Cornus	nuttallii

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	E			0500	CRATA	hawthorn spp.	Crataegus	spp.
	E			0501	CRCR2	cockspur hawthorn	Crataegus	crus-galli
	E			0502	CRMO2	downy hawthorn	Crataegus	mollis
	E			0503	CRBR3	Brainerd hawthorn	Crataegus	brainerdii
	E			0504	CRCA	pear hawthorn	Crataegus	calpodendron
	E			0505	CRCH	fireberry hawthorn	Crataegus	chrysocarpa
	E			0506	CRDI	broadleaf hawthorn	Crataegus	dilatata
	E			0507	CRFL	fanleaf hawthorn	Crataegus	flabellata
	E			0508	CRMO3	oneseed hawthorn	Crataegus	monogyna
	E			0509	CRPE	scarlet hawthorn	Crataegus	pedicellata
	E			5091	CRPH	Washington hawthorn	Crataegus	phaenopyrum
	E			5092	CRSU5	fleshy hawthorn	Crataegus	succulenta
	E			5093	CRUN	dwarf hawthorn	Crataegus	uniflora
	E	W		0510	EUCAL	eucalyptus spp.	Eucalyptus	spp.
X		W		0511	EUGL	Tasmanian bluegum	Eucalyptus	globulus
X	E			0512	EUCA2	river redgum	Eucalyptus	camaldulensis
X	E			0513	EUGR12	grand eucalyptus	Eucalyptus	grandis
X	E			0514	EURO2	swamp mahogany	Eucalyptus	robusta
	E			0520	DIOSP	persimmon spp.	Diospyros	spp.
X	E			0521	DIV15	common persimmon	Diospyros	virginiana
X	E			0522	DITE3	Texas persimmon	Diospyros	texana
	E		w	0523	EHAN	Anacua, knockaway	Ehretia	anacua
X	E			0531	FAGR	American beech	Fagus	grandifolia
	E	W		0540	FRAXI	ash spp.	Fraxinus	spp.
X	E			0541	FRAM2	white ash	Fraxinus	americana
X		W		0542	FRLA	Oregon ash	Fraxinus	latifolia
X	E			0543	FRNI	black ash	Fraxinus	nigra
X	E			0544	FRPE	green ash	Fraxinus	pennsylvanica
X	E			0545	FRPR	pumpkin ash	Fraxinus	profunda
X	E			0546	FRQU	blue ash	Fraxinus	quadrangulata
X		W		0547	FRVE2	velvet ash	Fraxinus	velutina
X	E			0548	FRCA3	Carolina ash	Fraxinus	caroliniana
X	E			0549	FRTE	Texas ash	Fraxinus	texensis
	E			5491	FRBE	Berlandier ash, Mexican ash	Fraxinus	berlandieriana
	E			0550	GLEDI	locust spp.	Gleditsia	spp.
X	E			0551	GLAQ	waterlocust	Gleditsia	aquatica
X	E			0552	GLTR	honeylocust	Gleditsia	triacanthos
X	E			0555	GOLA	loblolly bay	Gordonia	lasianthus
X	E	W		0561	GIBI2	Ginkgo, maidenhair tree	Ginkgo	biloba
X	E			0571	GYDI	Kentucky coffeetree	Gymnocladus	dioicus
	E			0580	HALES	silverbell spp.	Halesia	spp.
X	E			0581	HACA3	Carolina silverbell	Halesia	carolina
X	E			0582	HADI3	two-wing silverbell	Halesia	diptera
X	E			0583	HACA3	little silverbell	Halesia	parviflora
X	E			0591	ILOP	American holly	Ilex	opaca
	E	W		0600	JUGLA	walnut spp.	Juglans	spp.
X	E			0601	JUCI	butternut	Juglans	cinerea
X	E	W		0602	JUNI	black walnut	Juglans	nigra
		W		0603	JUHI	Northern California black walnut	Juglans	hindsii
X		W		0604	JUCA	Southern California black walnut	Juglans	californica
	E	W		0605	JUMI	Texas walnut	Juglans	microcarpa
X		W		0606	JUMA	Arizona walnut	Juglans	major
X	E			0611	LIST2	sweetgum	Liquidambar	styraciflua

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X	E			0621	LITU	yellow-poplar	Liriodendron	tulipifera
X		W		0631	LIDE3	tanoak	Lithocarpus	densiflorus
X	E			0641	MAPO	Osage-orange	Maclura	pomifera
	E			0650	MAGNO	magnolia spp.	Magnolia	spp.
X	E			0651	MAAC	cucumbertree	Magnolia	acuminata
X	E			0652	MAGR4	southern magnolia	Magnolia	grandiflora
X	E			0653	MAVI2	sweetbay	Magnolia	virginiana
X	E			0654	MAMA2	bigleaf magnolia	Magnolia	macrophylla
X	E			0655	MAFR	mountain magnolia, Fraser magnolia	Magnolia	fraseri
X	E			0657	MAPY	pyramid magnolia	Magnolia	pyramidata
X	E			0658	MATR	umbrella magnolia	Magnolia	tripetala
	E	W		0660	MALUS	apple spp.	Malus	spp.
X		W		0661	MAFU	Oregon crabapple	Malus	fusca
X	E			0662	MAAN3	southern crabapple	Malus	angustifolia
X	E			0663	MACO5	sweet crabapple	Malus	coronaria
X	E			0664	MAIO	prairie crabapple	Malus	ioensis
	E			0680	MORUS	mulberry spp.	Morus	spp.
X	E			0681	MOAL	white mulberry	Morus	alba
X	E			0682	MORU2	red mulberry	Morus	rubra
	E	W		0683	MOMI	Texas mulberry	Morus	microphylla
X	E			0684	MONI	black mulberry	Morus	nigra
	E			0690	NYSSA	tupelo spp.	Nyssa	spp.
X	E			0691	NYAQ2	water tupelo	Nyssa	aquatica
X	E			0692	NYOG	Ogeechee tupelo	Nyssa	ogeche
X	E			0693	NYSY	blackgum	Nyssa	sylvatica
X	E			0694	NYBI	swamp tupelo	Nyssa	biflora
X	E			0701	OSVI	eastern hophornbeam	Ostrya	virginiana
X	E			0711	OXAR	sourwood	Oxydendrum	arboreum
X	E			0712	PATO2	paulownia, empress-tree	Paulownia	tomentosa
	E	W		0720	PERSE	bay spp.	Persea	spp.
X	E			0721	PEBO	redbay	Persea	borbonia
X		W		7211	PEAM3	avocado	Persea	americana
X	E			0722	PLAQ	water-elm, planertree	Planera	aquatica
	E	W		0729	PLATA	sycamore spp.	Platanus	spp.
X		W		0730	PLRA	California sycamore	Platanus	racemosa
X	E			0731	PLOC	American sycamore	Platanus	occidentalis
X		W		0732	PLWR2	Arizona sycamore	Platanus	wrightii
	E	W		0740	POPUL	cottonwood and poplar spp.	Populus	spp.
X	E	W		0741	POBA2	balsam poplar	Populus	balsamifera
X	E			0742	PODE3	eastern cottonwood	Populus	deltoides
X	E			0743	POGR4	bigtooth aspen	Populus	grandidentata
X	E			0744	POHE4	swamp cottonwood	Populus	heterophylla
X	E	W		0745	PODEM	plains cottonwood	Populus	deltoides ssp. monilifera
X	E	W		0746	POTR5	quaking aspen	Populus	tremuloides
X		W		0747	POBAT	black cottonwood	Populus	balsamifera ssp. trichocarpa
X		W		0748	POFR2	Fremont's cottonwood	Populus	fremontii
X		W		0749	POAN3	narrowleaf cottonwood	Populus	angustifolia
X	E			0752	POAL7	silver poplar	Populus	alba
X	E			0753	PONI	Lombardy poplar	Populus	nigra
	E	W	w	0755	PROSO	mesquite spp.	Prosopis	spp.
X	E	W	w	0756	PRGL2	honey mesquite	Prosopis	glandulosa
X	E	W	w	0757	PRVE	velvet mesquite	Prosopis	velutina

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X	E	W	w	0758	PRPU	screwbean mesquite	Prosopis	pubescens
	E	W		0760	PRUNU	cherry and plum spp.	Prunus	spp.
	E	W		0761	PRPE2	pin cherry	Prunus	pensylvanica
X	E			0762	PRSE2	black cherry	Prunus	serotina
	E	W		0763	PRVI	common chokecherry	Prunus	virginiana
	E			0764	PRPE3	peach	Prunus	persica
X	E			0765	PRNI	Canada plum	Prunus	nigra
X	E			0766	PRAM	American plum	Prunus	americana
		W		0768	PREM	bitter cherry	Prunus	emarginata
	E			0769	PRAL5	Allegheny plum	Prunus	alleghaniensis
	E	W		0770	PRAN3	Chickasaw plum	Prunus	angustifolia
X	E			0771	PRAV	sweet cherry (domesticated)	Prunus	avium
	E			0772	PRCE	sour cherry (domesticated)	Prunus	cerasus
	E			0773	PRDO	European plum (domesticated)	Prunus	domestica
	E			0774	PRMA	Mahaleb plum (domesticated)	Prunus	mahaleb
	E	W		0800	QUERC	oak – deciduous spp.	Quercus	spp.
X		W		0801	QUAG	California live oak	Quercus	agrifolia
X	E			0802	QUAL	white oak	Quercus	alba
X		W	w	0803	QUAR	Arizona white oak	Quercus	arizonica
X	E			0804	QUBI	swamp white oak	Quercus	bicolor
		W		0805	QUCH2	canyon live oak	Quercus	chrysolepis
X	E			0806	QUCO2	scarlet oak	Quercus	coccinea
X		W		0807	QUDO	blue oak	Quercus	douglasii
X	E			0808	QUSIS	Durand oak	Quercus	sinuata var. sinuata
X	E			0809	QUEL	northern pin oak	Quercus	ellipsoidalis
X		W	w	0810	QUEM	Emory oak	Quercus	emoryi
X		W		0811	QUEN	Engelmann oak	Quercus	engelmannii
X	E			0812	QUFA	southern red oak	Quercus	falcata
X	E			0813	QUPA5	cherrybark oak	Quercus	pagoda
X		W	w	0814	QUGA	Gambel oak	Quercus	gambelii
X		W		0815	QUGA4	Oregon white oak	Quercus	garryana
X	E			0816	QUIL	scrub oak	Quercus	ilicifolia
X	E			0817	QUIM	shingle oak	Quercus	imbricaria
X		W		0818	QUKE	California black oak	Quercus	kelloggii
X	E			0819	QULA2	turkey oak	Quercus	laevis
X	E			0820	QULA3	laurel oak	Quercus	laurifolia
X		W		0821	QULO	California white oak	Quercus	lobata
X	E			0822	QULY	overcup oak	Quercus	lyrata
X	E			0823	QUMA2	bur oak	Quercus	macrocarpa
X	E			0824	QUMA3	blackjack oak	Quercus	marilandica
X	E			0825	QUMI	swamp chestnut oak	Quercus	michauxii
X	E			0826	QUMU	chinkapin oak	Quercus	muehlenbergii
X	E			0827	QUNI	water oak	Quercus	nigra
X	E			0828	QUBU2	Nuttall oak	Quercus	buckleyi
X		W	w	0829	QUOB	Mexican blue oak	Quercus	oblongifolia
X	E			0830	QUPA2	pin oak	Quercus	palustris
X	E			0831	QUPH	willow oak	Quercus	phellos
X	E			0832	QUPR2	chestnut oak	Quercus	prinus
X	E			0833	QURU	northern red oak	Quercus	rubra
X	E			0834	QUSH	Shumard's oak	Quercus	shumardii
X	E			0835	QUST	post oak	Quercus	stellata
	E			0836	QUSI2	Delta post oak	Quercus	similis
X	E			0837	QUVE	black oak	Quercus	velutina

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X	E			0838	QUVI	live oak	Quercus	virginiana
X		W		0839	QUWI2	interior live oak	Quercus	wislizeni
X	E			0840	QUMA6	dwarf post oak	Quercus	margarettae
X	E			0841	QUMI2	dwarf live oak	Quercus	minima
X	E			0842	QUIN	bluejack oak	Quercus	incana
X		W	w	0843	QUHY	silverleaf oak	Quercus	hypoleucoides
X	E			0844	QUOG	Oglethorpe oak	Quercus	oglethorpensis
	E			0845	QUPR	dwarf chinkapin oak	Quercus	prinoides
X		W	w	0846	QUGR3	gray oak	Quercus	grisea
X		W	w	0847	QURU4	netleaf oak	Quercus	rugosa
		W	w	0850	QUERC	oak – evergreen spp.	Quercus	spp.
	E			0851	QUGR	Chisos oak	Quercus	graciliformis
	E			8511	QUGR2	Graves oak, Chisos red oak	Quercus	gravesii
	E			8512	QUPO2	Mexican white oak, netleaf white oak	Quercus	polymorpha
	E			8513	QUBU2	Spanish oak, Buckley oak, Texas red	Quercus	buckleyi
	E			8514	QULA	lacey oak	Quercus	laceyi
	E			0852	AMEL	torchwood	Amyris	elemifera
	E			0853	ANGL4	pond apple	Annona	glabra
	E			0854	BUSI	gumbo limbo	Bursera	simaruba
	E			0855	CASUA	sheoak spp.	Casuarina	spp.
X	E			0856	CAGL11	gray sheoak	Casuarina	glauca
X	E			0857	CALE28	Australian pine	Casuarina	lepidophloia
	E			0858	CICA	camphor tree	Cinnamomum	camphora
	E			0859	CIFR	fiddlewood	Citharexylum	fruticosum
	E			0860	CITRU2	citrus spp.	Citrus	spp.
	E			0863	CODI8	pigeon plum, tietongue	Coccoloba	diversifolia
	E			0864	COEL2	soldierwood	Colubrina	elliptica
	E			0865	COSE2	geiger tree	Cordia	sebestena
	E			8651	COBO2	Anacahuita, Texas olive	Cordia	boissieri
	E			0866	CUAN4	carrotwood	Cupaniopsis	anacardioides
	E		w	0867	COHO	Bluewood, Brazilian bluewood	Condalia	hookeri
	E			0868	EBEB	blackbead ebony, Texas ebony	Ebenopsis	ebano
	E			0869	LEPU3	great leucaena, great leadtree	Leucaena	pulverulenta
	E			0870	SOAF	Texas sophora, Eve's necklacepod	Sophora	affinis
	E			0873	EURH	red stopper	Eugenia	rhombea
	E			0874	EXPA	Inkwood, butterbough	Exothea	paniculata
	E			0876	FIAU	strangler fig	Ficus	aurea
	E			0877	FICI	shortleaf fig, wild banyantree	Ficus	citrifolia
	E			0882	GUDI	Blolly, beeftree	Guapira	discolor
	E			0883	HIMA2	manchineel	Hippomane	mancinella
	E			0884	LYLA3	false tamarind	Lysiloma	latisiliquum
	E			0885	MAIN3	mango	Mangifera	indica
	E			0886	METO3	poisonwood	Metopium	toxiferum
	E			0887	PIPI3	fishpoison tree	Piscidia	piscipula
	E			0888	SCAC2	schefflera, octopus tree	Schefflera	actinophylla
	E			0890	SIFO	false mastic	Sideroxylon	foetidissimum
	E			0891	SISA6	white bully, willow bustic	Sideroxylon	salicifolium
	E			0895	SIGL3	paradise tree	Simarouba	glauca
	E			0896	SYCU	Java plum	Syzygium	cumini
	E			0897	TAIN2	tamarind	Tamarindus	indica
X	E	W		0901	ROPS	black locust	Robinia	pseudoacacia

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		W	w	0902	RONE	New Mexico locust	Robinia	neomexicana
	E			0906	ACWR4	paurotis palm	Acoelorrhaphe	wrightii
	E			0907	COAR	silver palm	Coccothrinax	argentata
	E			0908	CONU	coconut palm	Cocos	nucifera
	E			0909	ROYST	royal palm spp.	Roystonea	spp.
	E			0911	SAME8	Mexican palmetto, Rio Grande palmetto	Sabal	mexicana
X	E			0912	SAPA	cabbage palmetto	Sabal	palmetto
	E			0913	THMO4	key thatch palm	Thrinax	morrisii
	E			0914	THRA2	Florida thatch palm	Thrinax	radiata
	E			0915	ARECA	other palms	Family Arecaceae	not listed above
	E	W		0919	SASAD	western soapberry	Sapindus	saponaria var. drummondii
	E	W		0920	SALIX	willow spp.	Salix	spp.
	E	W		0921	SAAM2	peachleaf willow	Salix	amygdaloides
	E	W		0922	SANI	black willow	Salix	nigra
	E	W		0923	SABE2	Bebb willow	Salix	bebbiana
		W		0924	SABO	red willow	Salix	bonplandiana
X	E			0925	SACA5	coastal plain willow	Salix	caroliniana
X	E			0926	SAPY	balsam willow	Salix	pyrifolia
	E	W		0927	SAAL2	white willow	Salix	alba
		W		0928	SASC	Scouler's willow	Salix	scouleriana
X	E			0929	SASE10	weeping willow	Salix	sepulcralis
X	E			0931	SAAL5	sassafras	Sassafras	albidum
	E			0934	SORBU	mountain ash spp.	Sorbus	spp.
	E			0935	SOAM3	American mountain ash	Sorbus	americana
X	E			0936	SOAU	European mountain ash	Sorbus	aucuparia
X	E			0937	SODE3	northern mountain ash	Sorbus	decora
	E			0940	SWMA2	mahogany	Swietenia	mahagoni
	E			0950	TILIA	basswood spp.	Tilia	spp.
X	E			0951	TIAM	American basswood	Tilia	americana
	E			0952	TIAMH	white basswood	Tilia	americana var. heterophylla
	E			0953	TIAMC	Carolina basswood	Tilia	americana var. caroliniana
	E			0970	ULMUS	elm spp.	Ulmus	spp.
X	E			0971	ULAL	winged elm	Ulmus	alata
X	E			0972	ULAM	American elm	Ulmus	americana
X	E			0973	ULCR	cedar elm	Ulmus	crassifolia
X	E			0974	ULPU	Siberian elm	Ulmus	pumila
X	E			0975	ULRU	slippery elm	Ulmus	rubra
X	E			0976	ULSE	September elm	Ulmus	serotina
X	E			0977	ULTH	rock elm	Ulmus	thomasii
X		W		0981	UMCA	California laurel	Umbellularia	californica
		W		0982	YUBR	Joshua tree	Yucca	brevifolia
	E			0986	AVGE	black mangrove	Avicennia	germinans
	E			0987	COER2	buttonwood mangrove	Conocarpus	erectus
	E			0988	LARA2	white mangrove	Laguncularia	racemosa
X	E			0989	RHMA2	American mangrove	Rhizophora	mangle
		W	w	0990	OLTE	desert ironwood	Olneya	tesota
	E	W		0991	TAMAR2	saltcedar	Tamarix	spp.
X	E			0992	MEQU	melaleuca	Melaleuca	quinquenervia
X	E			0993	MEAZ	chinaberry	Melia	azedarach
X	E			0994	TRSE6	Chinese tallowtree	Triadica	sebifera
X	E			0995	VEFO	tungoil tree	Vernicia	fordii
X	E			0996	COOB2	smoketree	Cotinus	obovatus

Core	East	West	Wood-land	FIA Code	PLANTS Code	Common Name	Genus	Species
	E	W		0997	ELAN	Russian-olive	Elaeagnus	angustifolia
X	E	W		0998	2TB	unknown dead hardwood	Tree	broadleaf
X	E	W		0999	2TREE	other, or unknown live tree	Tree	unknown

## Appendix 4. Site Tree Selection Criteria and Species List

### A. Eastern U.S. Site-Tree Selection Criteria

Ideally, site trees in the eastern U.S. should be between 20-70 years old. If preferred trees cannot be found in this age range, expand the age range to 15-120 years. Reject trees outside the 15-120 year age range, trees that exhibit signs of damage, trees with ring patterns that show signs of suppression, trees less than 5.0 inches DBH, trees with abnormalities at DBH, and trees with rotten cores. A list of preferred site-tree species is provided. Site trees should be selected in the following order of preference:

- 1st Choice: representative of the stand, on the list for your region.
- 2nd Choice: representative of the stand, on the list for an adjoining eastern region.
- 3rd Choice: not representative of the stand, on the list for your region.
- 4th Choice: not representative of the stand, on the list for an adjoining eastern region.

Note: NE = Northeast, NC = North Central, SO = Southern

Site trees listed in gray text are not valid in the Southern Region. Crews should select suitable trees listed below in black text.

Code	Common Name	Region
<b>----- Softwood Species -----</b>		
0012	balsam fir	NE, NC
0043	Atlantic white-cedar	NE
0068	eastern redcedar	NE, NC
0070	larch (introduced)	NE
0071	tamarack (native)	NE, NC
0094	white spruce	NE, NC
0095	black spruce	NE, NC
0097	red spruce	NE
0105	jack pine	NE, NC
0107	sand pine	SO
0110	shortleaf pine	NE, NC, SO
0111	slash pine	SO
0121	longleaf pine	SO
0122	Ponderosa pine	NC
0125	red pine	NE, NC
0128	pond pine	NE, SO
0129	eastern white pine	NE, NC, SO
0130	Scotch pine	NE, NC
0131	loblolly pine	NE, NC, SO
0132	Virginia pine	NE, NC, SO
0135	Arizona pine	SO
0202	Douglas-fir	SO
0241	northern white cedar	NE, NC
0261	eastern hemlock	NE
<b>----- Hardwood Species -----</b>		
0316	red maple	NE, NC
0317	silver maple	NE, NC
0318	sugar maple	NE, NC
0371	yellow birch	NE, NC
0375	paper birch	NE, NC
0402	bitternut hickory	NE, NC
0407	shagbark hickory	NE, NC
0462	hackberry	NC
0531	American beech	NE, NC
0541	white ash	NE, NC

<b>Code</b>	<b>Common Name</b>	<b>Region</b>
0543	black ash	NE, NC
0544	green ash	NE, NC
0602	black walnut	NC
0611	sweetgum	NE, NC, SO
0621	yellow-poplar	NE, NC, SO
0742	eastern cottonwood	NE, NC, SO
0743	bigtooth aspen	NE, NC
0745	plains cottonwood	SO
0746	quaking aspen	NE, NC, SO
0748	Fremont poplar	SO
0749	narrowleaf cottonwood	SO
0762	black cherry	NC
0802	white oak	NE, NC, SO
0806	scarlet oak	NE, NC, SO
0812	southern red oak	NE, SO
0813	cherrybark oak	NE, NC, SO
0817	shingle oak	NE, NC, SO
0827	water oak	NE, SO
0830	pin oak	NE, NC, SO
0832	chestnut oak	NE, NC, SO
0833	northern red oak	NE, NC, SO
0835	post oak	NE, NC, SO
0837	black oak	NE, NC, SO
0901	black locust	NE, NC
0951	American basswood	NE, NC
0972	American elm	NE, NC

## B. Western U.S. Site-Tree Selection Criteria

Ideally, site trees in the western U.S. should be between 35-80 years old. If preferred trees cannot be found in this age range, expand the age range to 15-250 years. Reject trees outside the 15-250 year age range, trees that exhibit signs of damage, trees with ring patterns that show signs of suppression, trees less than 5.0 inches DBH, trees with abnormalities at DBH, trees with rotten cores, and woodland species. A list of preferred site-tree species is provided. Site trees should be selected in the following order of preference:

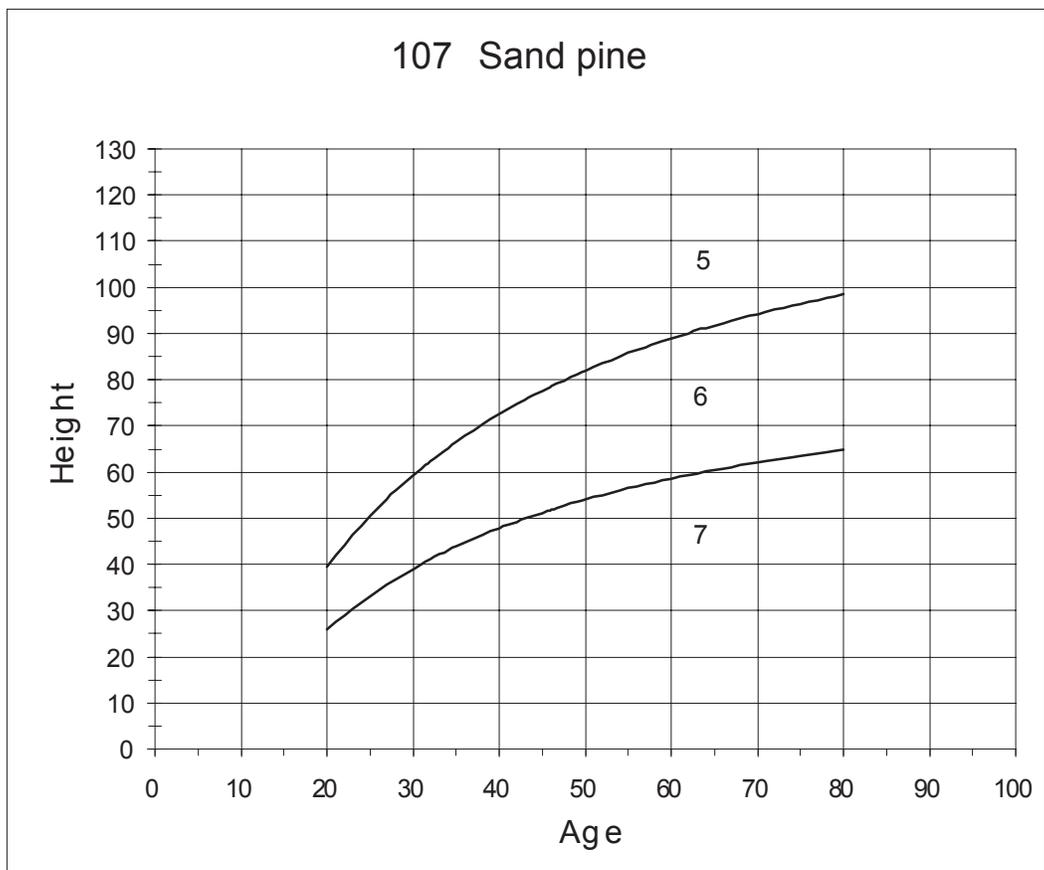
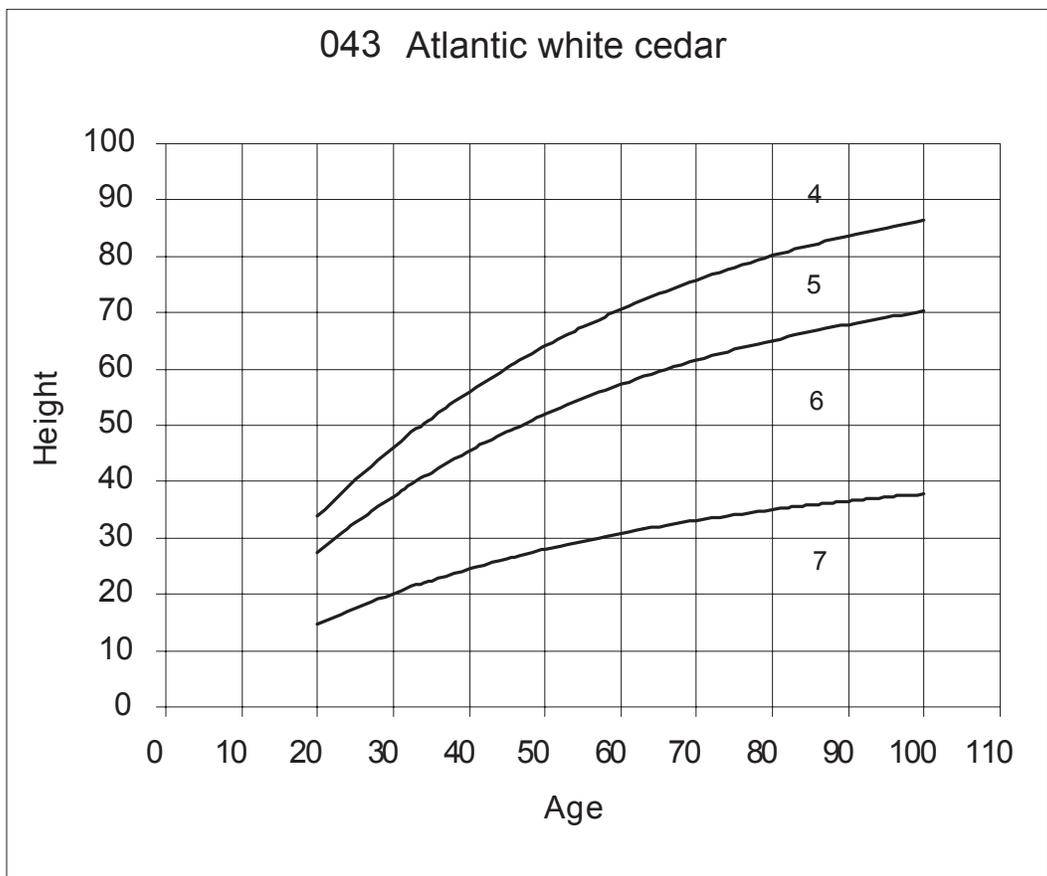
- 1st Choice: representative of the stand, on the list for your region.
- 2nd Choice: representative of the stand, on the list for an adjoining western region.
- 3rd Choice: not representative of the stand, on the list for your region.
- 4th Choice: not representative of the stand, on the list for an adjoining western region.

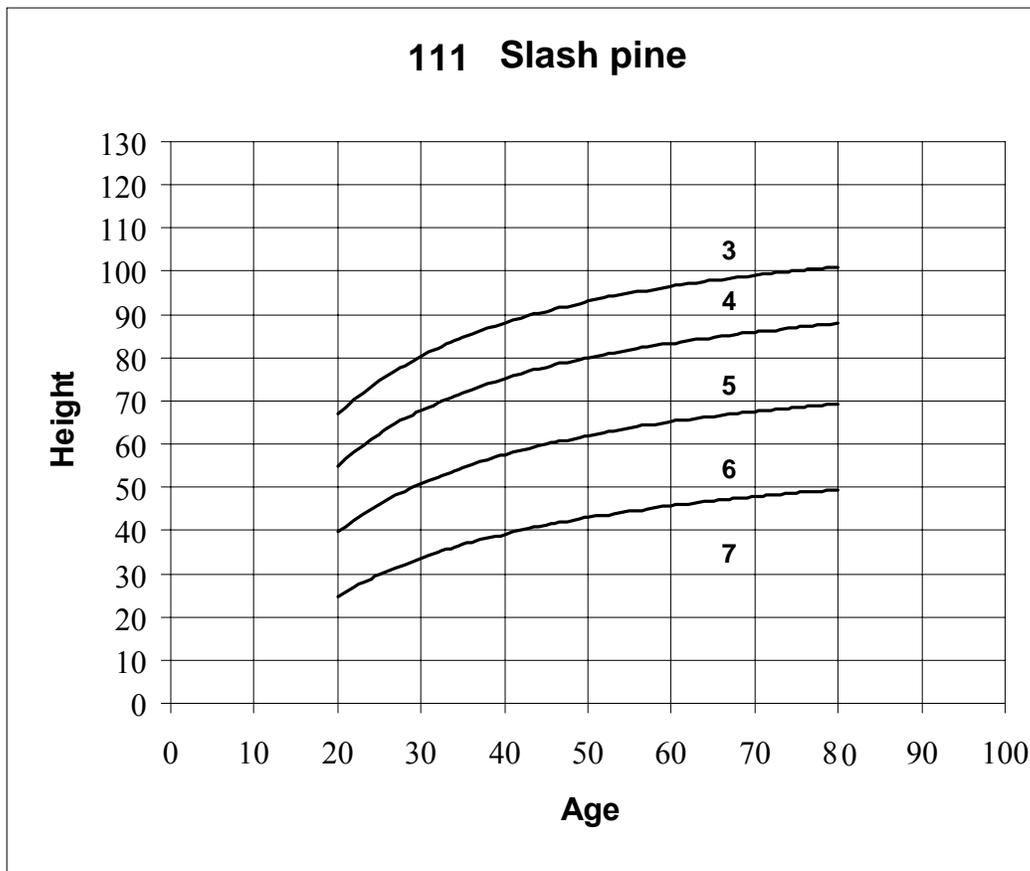
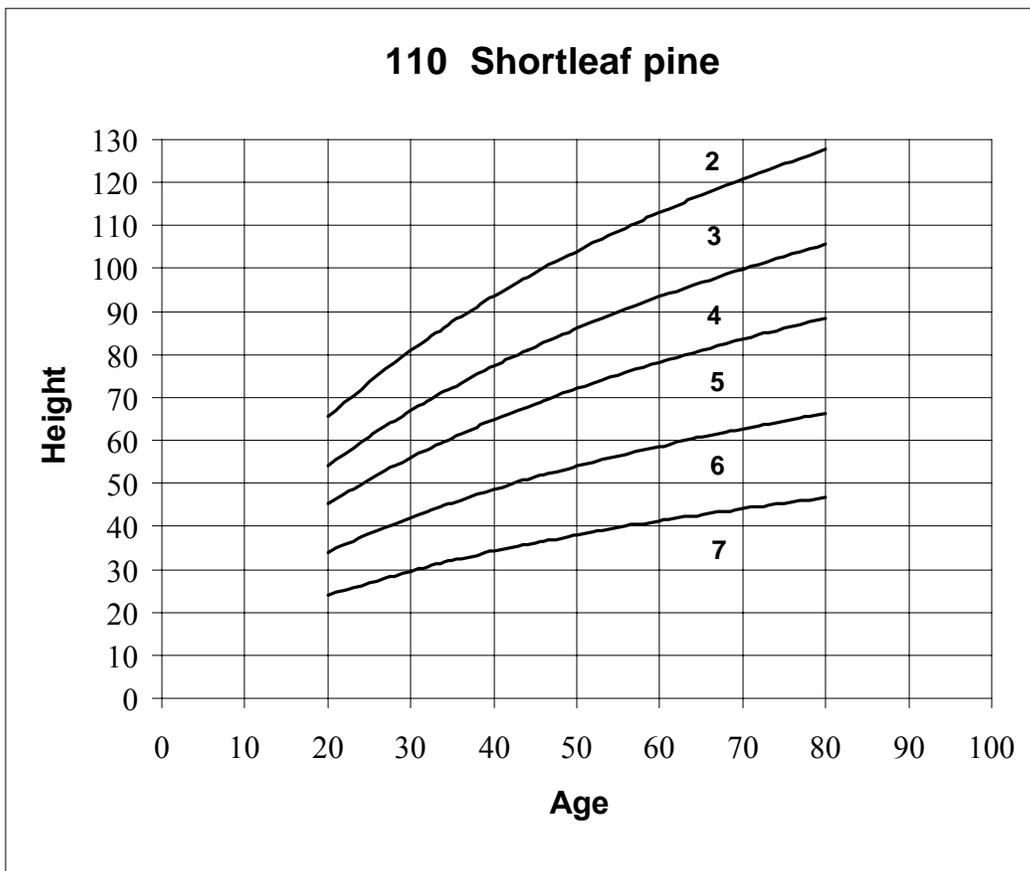
Note: PNW = Pacific Northwest FIA, RMRS = Rocky Mountain FIA

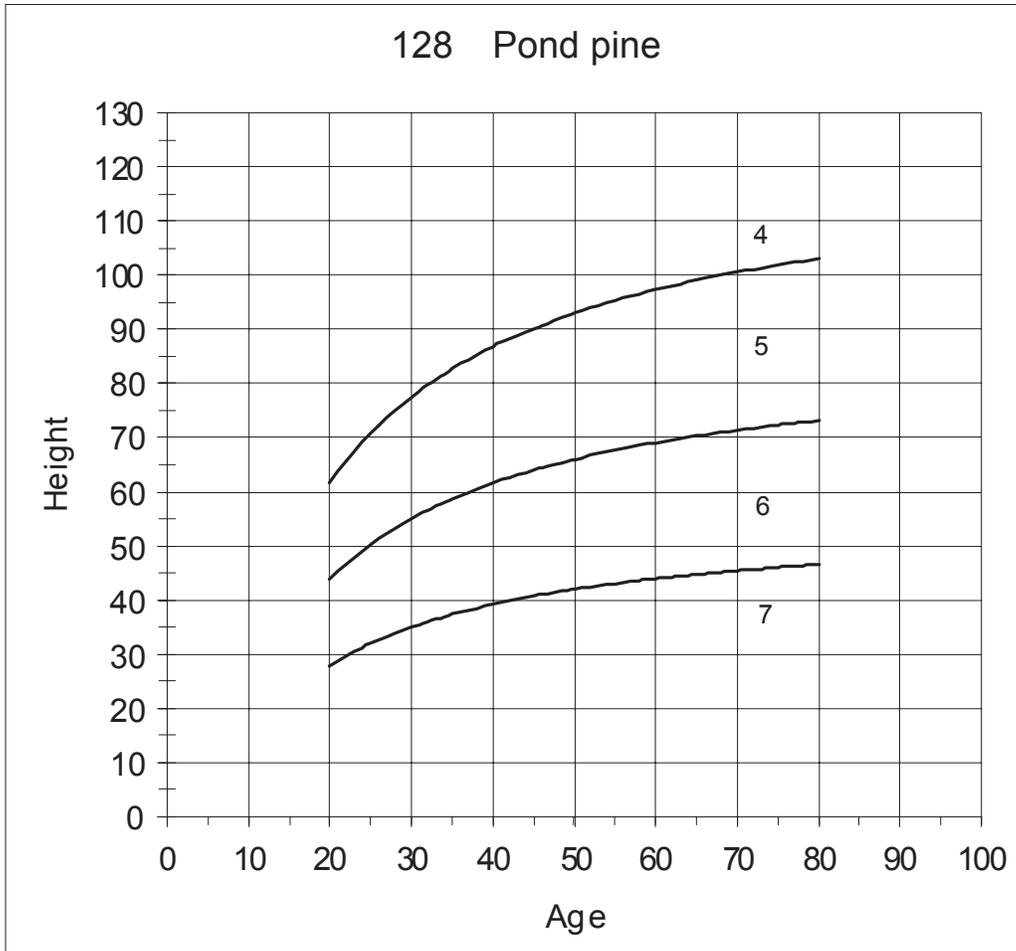
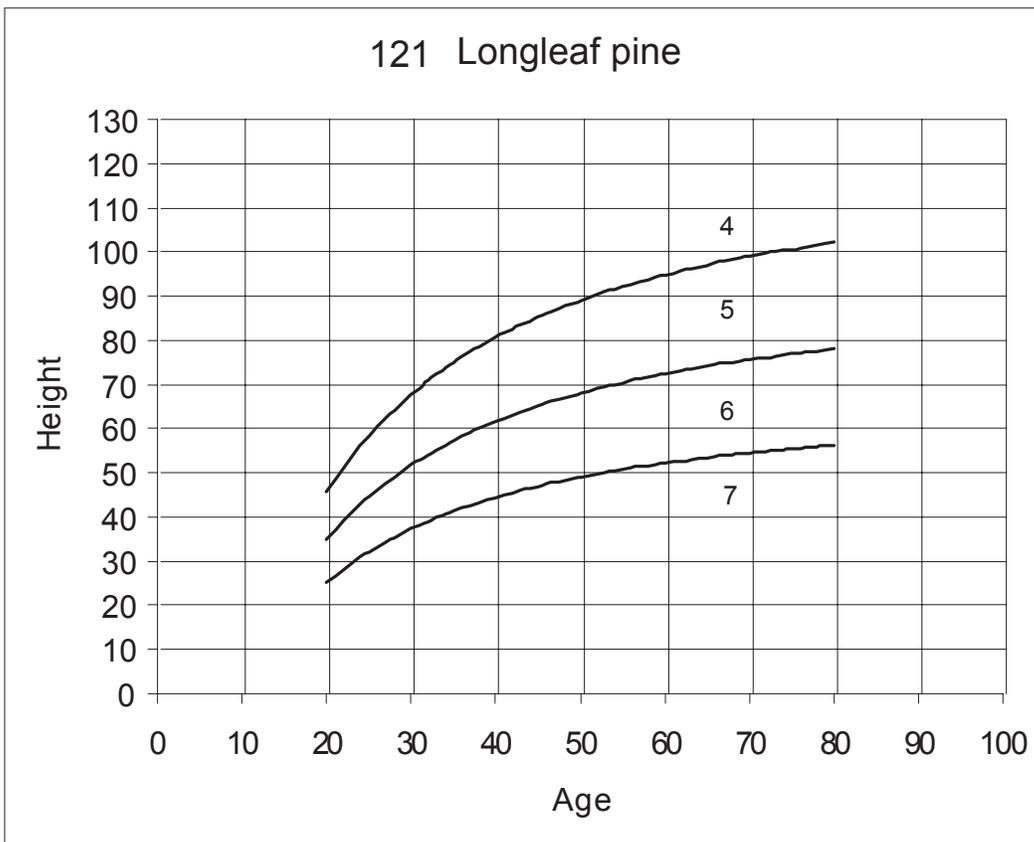
Code	Common Name	Region
<b>----- Softwood Species -----</b>		
0011	Pacific silver fir	PNW
0015	white fir	RMRS, PNW
0017	grand fir	RMRS, PNW
0018	corkbark fir	RMRS
0019	subalpine fir	RMRS, PNW
0020	California red fir	RMRS, PNW
0021	shasta red fir	PNW
0022	noble fir	PNW
0073	western larch	RMRS, PNW
0081	incense-cedar	RMRS, PNW
0093	Engelmann spruce	RMRS, PNW
0094	white spruce	RMRS, PNW
0095	black spruce	PNW
0096	blue spruce	RMRS
0098	sitka spruce	PNW
0104	foxtail pine	RMRS
0108	lodgepole pine	RMRS, PNW
0109	Coulter pine	PNW
0112	Apache pine	RMRS
0116	Jeffrey pine	RMRS, PNW
0117	sugar pine	RMRS, PNW
0119	western white pine	RMRS, PNW
0120	bishop pine	PNW
0122	ponderosa pine	RMRS, PNW
0135	Arizona pine	RMRS
0201	bigcone Douglas-fir	PNW
0202	Douglas-fir	RMRS, PNW
0211	redwood	PNW
0231	Pacific yew	PNW
0242	western redcedar	RMRS, PNW
0263	western hemlock	RMRS, PNW
0264	mountain hemlock	RMRS, PNW
<b>----- Hardwood Species -----</b>		
0312	bigleaf maple	PNW
0351	red alder	PNW
0375	paper birch	RMRS, PNW
0741	balsam poplar	RMRS, PNW
0745	plains cottonwood	RMRS
0746	quaking aspen	RMRS, PNW

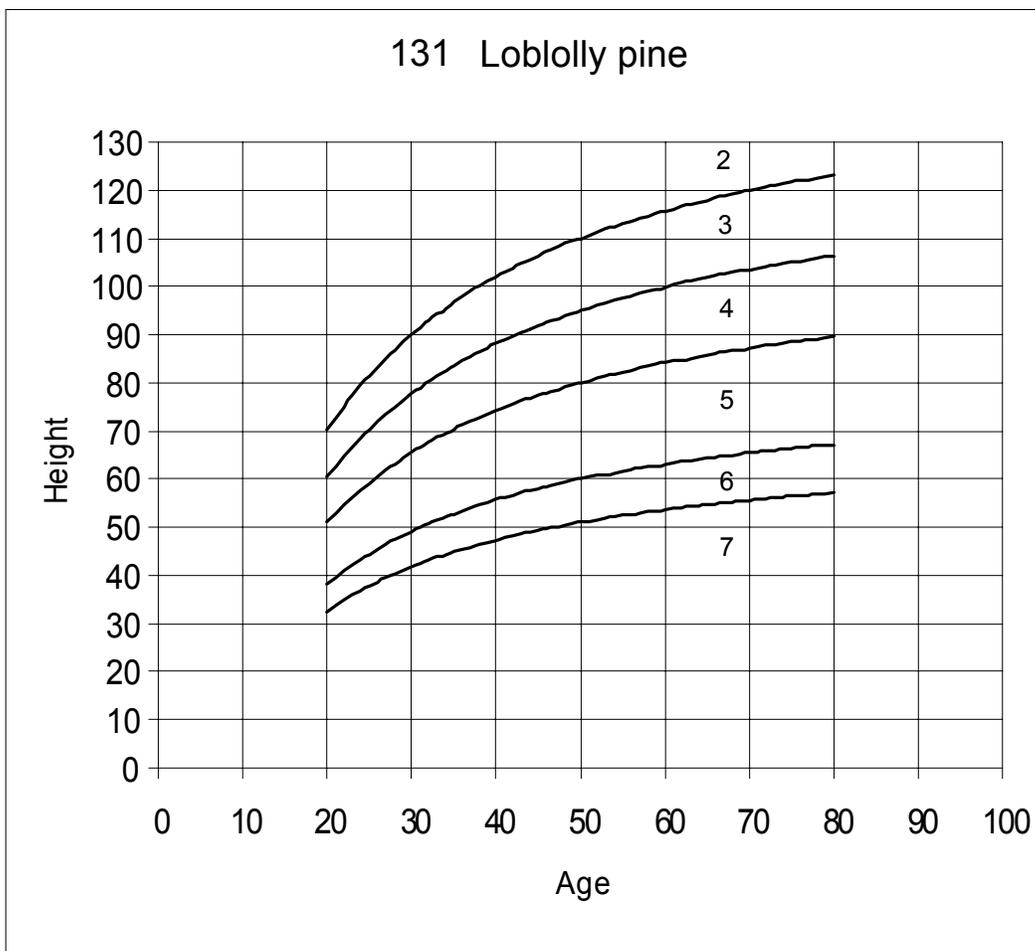
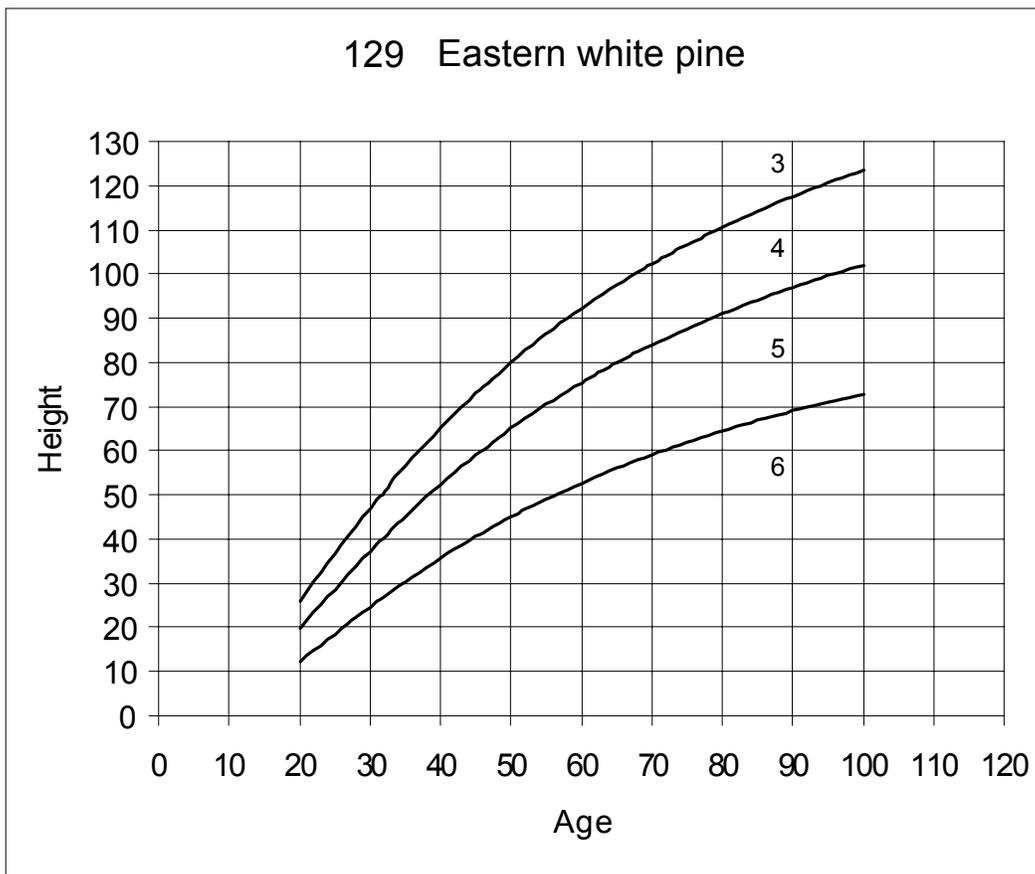
<b>Code</b>	<b>Common Name</b>	<b>Region</b>
0747	black cottonwood	RMRS, PNW
0748	Fremont poplar	RMRS
0749	narrowleaf cottonwood	RMRS

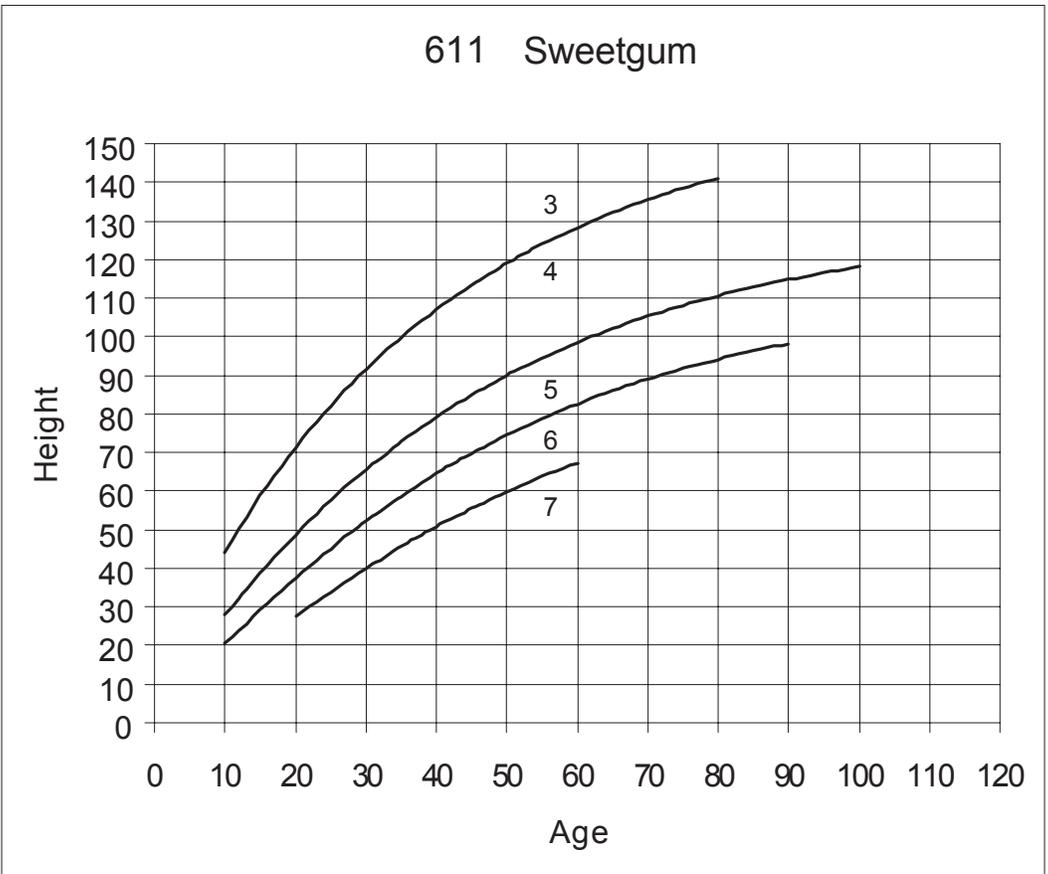
SOUTHERN SITE CLASS CURVES

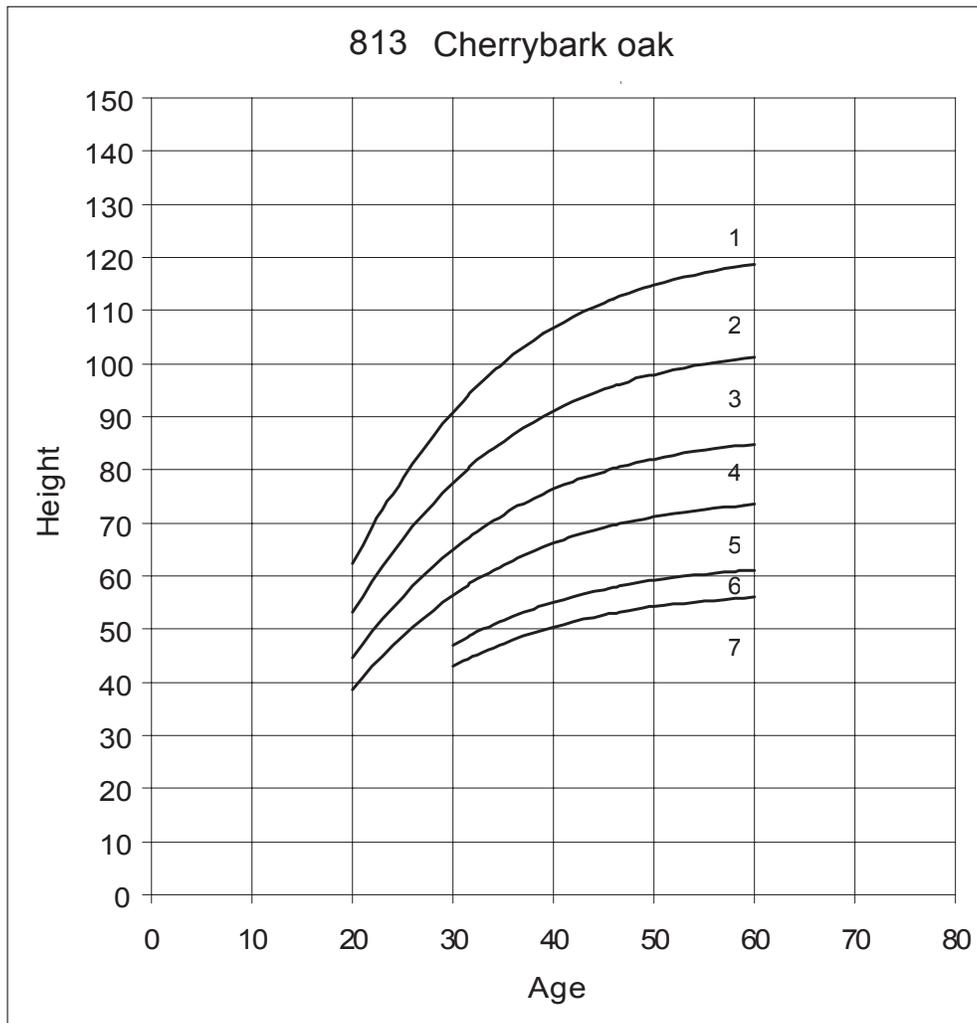
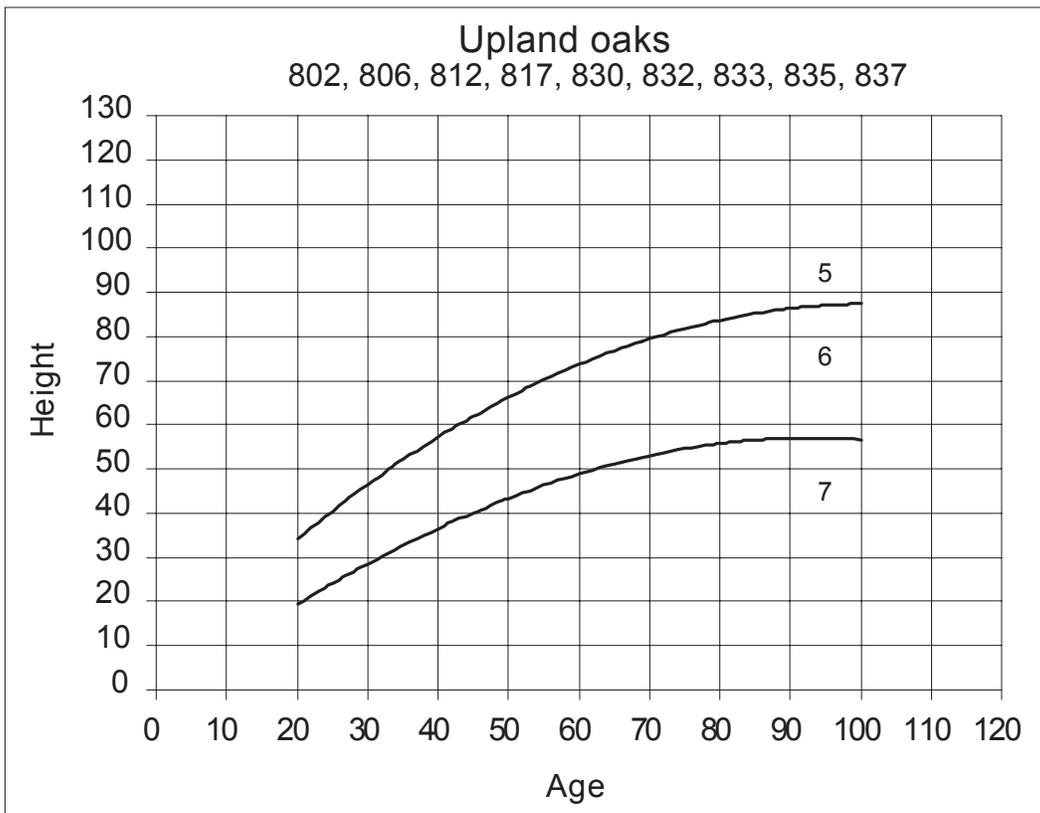


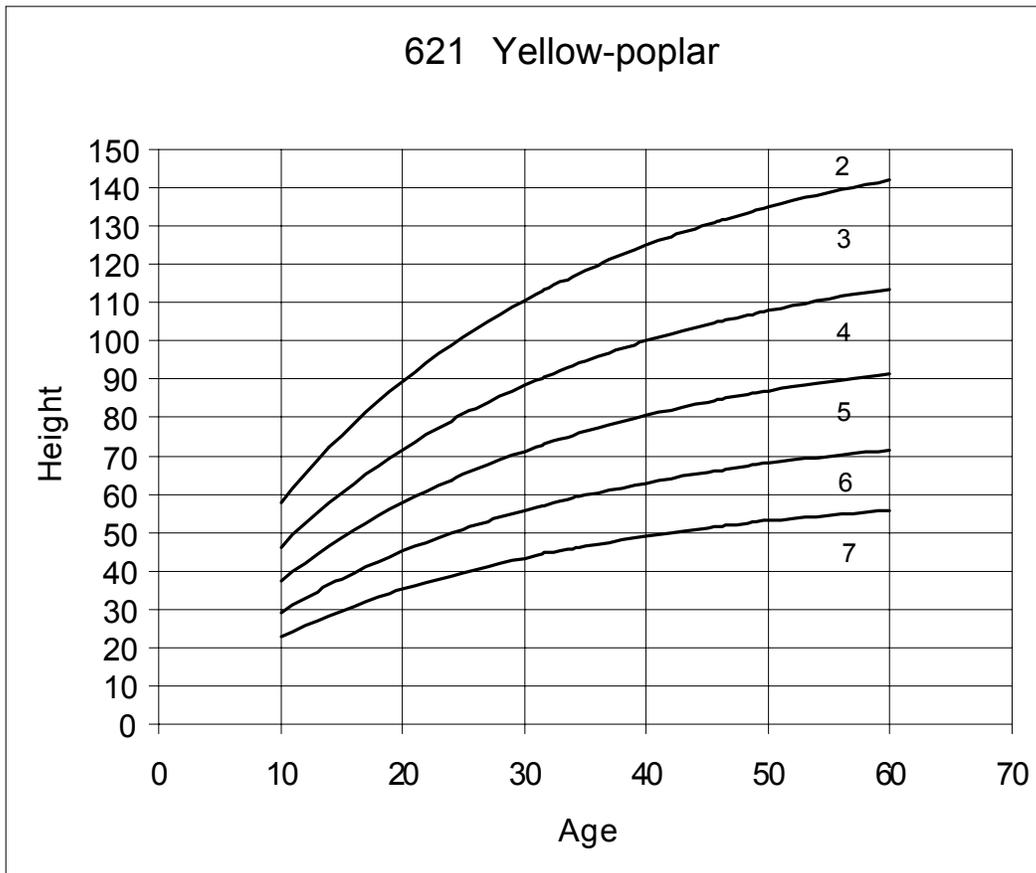




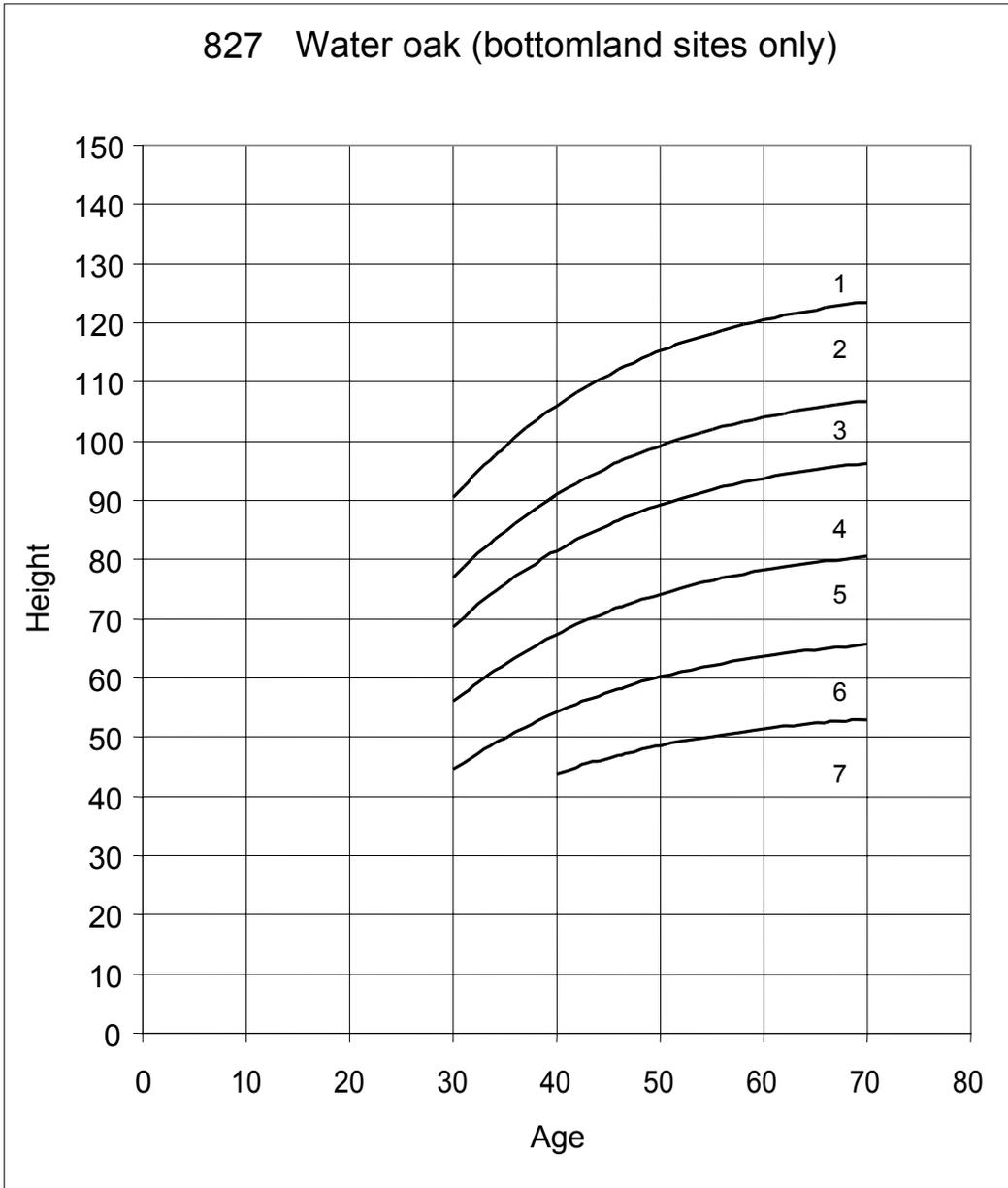








### 827 Water oak (bottomland sites only)



**Appendix 5. Determination of Stocking Values for Land Use Classification**

Stocking is defined as the degree of occupancy of land by trees, measured basal area or the number of trees in a stand and spacing in the stand, compared with a minimum standard based on tree size, required to fully utilize the growth potential of the land.

There are several area-related items that are assigned by stocking computations. Forest type and stand size are two area classifications that are computed by stocking equations. Several of the past treatment items are assigned based on certain stocking thresholds. Therefore, it is necessary that field crews have a fundamental understanding of stocking computation to aid in the assignment of stocking-related area classifications.

The minimum standard used by FIA in the South is summarized in Table 1, illustrating the minimum number of trees and basal area per acre by DBH class needed for full (100 percent) stocking.

**Table 1.**

DBH class	Trees per acre for full stocking	Basal area per acre	DBH class	Trees per acre for full stocking	Basal area per acre
Seedling	600	--	12	115	90
2	560	--	14	90	96
4	460	--	16	72	101
6	340	67	18	60	106
8	240	84	20	51	111
10	155	85			

This table can be used to determine stocking levels on a per-acre basis. For example, reversions from a nonforest land use to forestland, especially in the early stages of natural reversion, can be questionable to field crews. The minimum stocking required to qualify as forestland is 10 percent stocking of live trees. The minimum number of seedlings per acre needed for full stocking is 600. Therefore, an area (such as an old field or pasture) that has indications of natural seeding must have a minimum of 10 percent or 60 seedlings per acre (0.10 x 600). If a potentially reverted area has a mix of trees in several size classes, the total stocking can be derived from summing the stocking percents for each tree by diameter class. The stocking percent for an individual tree is:

$$\left( \frac{1}{\text{number of trees per acre needed for full stocking}} \right) * 100$$

**Example: Field crews encounter an area classified as idle farmland in previous survey. They now determine that there are twenty seedlings, ten 2-inch trees, four 6-inch trees and two 20-inch trees on the acre. The stocking total for the area can be determined as follows:**

DBH class	Number of trees per acre	Stocking percent per tree	Stocking percent per tree * number of trees per acre
Seedlings	20	0.17 (1/600)	3.4
2-inch	10	0.18 (1/560)	1.8
6-inch	4	0.29 (1/340)	1.2
10-inch	2	2.00 (1/51)	4.0
Total stocking =			10.4%

Therefore, the total stocking percent for this acre is 10.4 percent. Since the minimum stocking percent for forestland is 10 percent, this area may qualify as a reversion.

Basal area per acre can also be used to determine different levels of stocking. However, basal area has very little application in young stands where the majority of trees are less than 5.0 inches DBH.

Stocking percents can also be derived from the tally on the mapped plot. All stocking totals are computed at the condition level. When computing stocking totals for a condition, do not include tree stocking from another condition. Table 2 illustrates stocking percents for trees tallied on varying numbers of subplots in a single forest condition.

**Table 2. Stocking percent for an individual tree tallied on varying numbers of subplots in timberland condition**

Tree size	4 subplots in a single condition (1/6 acre)	3 subplots in a single condition (1/8 acre)	2 subplots in a single condition (1/12 acre)	1 subplot in a single condition (1/24 acre)
<i>Percent</i>				
Seedling	12.5	16.7	25.0	50.0
2	13.4	17.8	26.7	53.5
4	16.3	21.8	32.7	65.3
6	1.8	2.4	3.5	7.1
8	2.5	3.3	5.0	10.0
10	3.9	5.2	7.7	15.5
12	5.2	7.0	10.4	20.9
14	6.7	8.9	13.3	26.7
16	8.3	11.1	16.7	33.3
18	10.0	13.3	20.0	40.0
20+	11.7	15.7	23.5	47.0

*Note: Stocking percents for trees less than 5.0 inches DBH are based on the 1/300-acre microplot (6.8 foot radius)*

The stocking percents for each tree are derived from the equation:

$$\left( \frac{1}{(\text{Number of trees per acre required for full stocking}) \left( \frac{\text{Total area sampled}}{\text{Area of an acre}} \right)} \right) * 100$$

**Example 1** -- The stocking percent for a 6-inch tree on a plot where all four subplots are in a single condition is:

Four subplots have a total area sampled of 7238.23 sq. ft.

Area of an acre is 43560 sq. ft.

Number of 6-inch trees per acre for full stocking is 340 (from Table 1)

$$\text{Stocking percent} = \left( \frac{1}{(340) \left( \frac{7238.23}{43560} \right)} \right) * 100 = 1.8 \text{ percent}$$

Example 2 – The stocking percent for a seedling on a microplot where there is only one microplot in the condition is:

One microplot has a total area sampled of 145.27 sq.ft.

Area of an acre is 43560 sq. ft.

Number of seedlings per acre for full stocking is 600

$$\text{Stocking percent} = \left( \frac{1}{(600) \left( \frac{145.27}{43560} \right)} \right) * 100 = 50 \text{ percent}$$

As Table 2 illustrates, stocking percents are directly related to the amount of area sampled in a condition. The smaller the area sampled, the higher the stocking percent per tree.

Forest conditions that are sampled by very small areas such as "pieces" or "slivers" of subplots often yield very distorted classifications of area attributes such as forest type or stand size if based on tree tally alone.

Therefore, there will be many instances where the field call will provide a much better description of the stand.

Forest type is an area item that is assigned based on stocking proportions of tree species. A forest condition that has 100 percent total stocking of all live trees with 80 percent total stocking of pines and 20 percent stocking of hardwoods would be assigned a pine forest type since pines account for 80 percent of total stocking.



## Appendix 6. Glossary

**Accessible Forest Land** – Land that is within sampled area (the population of interest), is accessible and can safely be visited, and meets at least one of the two following criteria:

- (a) the condition is at least 10-percent stocked by trees (appendix 3) of any size or has been at least 10-percent stocked in the past. Additionally, the condition is not subject to nonforest use(s) that prevent normal tree regeneration and succession such as regular mowing, grazing, or recreation activities, or
- b) in several woodland types where stocking cannot be determined, and the condition has at least 5 percent crown cover by trees of any size, or has had at least 5 percent cover in the past. Additionally, the condition is not subject to nonforest use that prevent normal regeneration and succession such as regular mowing, grazing, or recreation activities.

**Accessible Other Forest Land** – Land that meets the definition of accessible forest land, but is incapable of producing 20 cubic feet per acre per year of industrial wood under natural conditions because of adverse site conditions (SITE CLASS = 7). Adverse conditions include sterile soils, dry climate, poor drainage, high elevation, steepness and soil rockiness.

**ACTUAL LENGTH** – For trees with broken or missing tops. The actual length of the tree is recorded to the nearest 1.0 foot from ground level to the highest remaining portion of the tree still present and attached to the bole. If the top is intact, this item may be omitted. Forked trees should be treated the same as unforked trees.

**Agricultural Land** – Land managed for crops, pasture, or other agricultural use. Evidence includes geometric field and road patterns, fencing, and the traces produced by livestock or mechanized equipment. The area must be at least 1.0 acre in size and 120.0 feet wide at the point of occurrence.

**Annular plot** – a circular ring with a beginning radius of 24.0 feet from subplot center and an ending radius of 58.9 feet.

**ARTIFICIAL REGENERATION SPECIES** – Indicates the predominant species that is planted or seeded in an artificially regenerated condition.

**Black Knot** – Visible branches, stubs or sockets that do not conform to the definition of sound red knots.

**Blind check** – a re-installation of a production plot done by a qualified crew without production crew data on hand. A full re-installation of the plot is recommended for the purpose of obtaining a measure of uncertainty in the data. If a full plot re-installation is not possible, then full subplots will be completed with a minimum of 15 total trees being remeasured. All plot-level information (e.g., boundary and condition information) will be collected on each blind check plot. The two data sets are maintained separately. Discrepancies between the two sets of data are not reconciled. Blind checks are done on production plots only.

**BOARD-FOOT CULL** – Solid wood cull due to sweep, crook, and excessive knot collars, as well as unsound cull due to rotten or missing wood. Board-foot cull is expressed as a percentage of the sawlog portion of the tree.

**Bole** – The main stem of a tree, extending from one foot above the ground to the point on the tree where DOB reaches 4 inches

**Botched plot** – A plot that should not be included in the standard inventory data base due to data collection errors or other problems.

**Boundary** – The intersection of two or more conditions on a subplot or microplot. Each boundary is described by recording the azimuth and horizontal distance from the subplot or microplot center to the left and right points of where the boundary intersects the perimeter of the subplot or microplot. An azimuth and distance to a corner point may also be described, if one exists. If multiple boundaries exist at a subplot, they are recorded in the order of their occurrence on the subplot, starting from north and proceeding around the compass.

**Census Water** – Rivers and streams that are more than 200 feet wide and bodies of water that are greater than 4.5 acres in size.

**Certification plot** – a plot installed by a certification candidate. It may be a training plot or a production plot. The candidate working alone installs the plot.

**Cold check** – An inspection of a production plot done either as part of the training process, periodic review of field crew performance, or as part of the ongoing QA/QC program. Normally the installation crew is not present at the time of inspection. The inspector has the completed data in-hand at the time of inspection. The inspection can include the whole plot or a subset of the plot. Discrepancies between the inspection crew measurements and the production crew measurements are identified, and changes may be made to production data to correct these errors. Cold checks are done on production plots only.

**CONDITION CLASS** – The combination of discrete landscape and forest attributes that identify and define different strata on the plot. Examples of such attributes include condition class status, forest type, stand origin, stand size, owner group, reserve status and stand density.

**Cropland** – Land under cultivation within the past 24 months, including orchards and land in soil improving crops, but excluding land cultivated in developing improved pasture.

**CROWN CLASS** – A classification of trees based on dominance in relation to adjacent trees within the stand as indicated by crown development and the amount of sunlight received from above and sides.

**Cull** – Portions of a tree that are unusable for industrial wood products because of rot, form, or other defect.

**Diameter at Breast Height (DBH)** – The diameter of the bole of a tree at breast height (4.5 feet above the ground), measured outside of the bark.

**Diameter at Root Collar (DRC)** – The diameter of a tree measured at the ground line or stem root collar, measured outside of the bark.

**Diameter Outside Bark (DOB)** – A diameter that may be taken at various points on a tree, or log, **outside** of the bark. Diameter Outside Bark is often estimated.

**Federal Information Processing Standard (FIPS)** – A unique code identifying U.S. States and counties (or units in Alaska).

**Forest Industry Land** – Land owned by companies or individuals that operate wood-using plants.

**Forest Trees** – Plants having a well-developed, woody stem and usually more than 12 feet in height at maturity.

**FOREST TYPE** – A classification of forest land based upon the trees or tree communities that constitute the majority of stocking on the site.

**GPS** – Global Positioning System. Information from this system is collected and used to determine the latitude and longitude of each plot.

**Hardwoods** – Dicotyledonous trees, usually broad-leaved and deciduous.

**Hot check** – an inspection normally done as part of the training process. The inspector is present on the plot with the trainee and provides immediate feedback regarding data quality. Data errors are corrected. Hot checks can be done on training plots or production plots.

**Idle Farmland** -- Former cropland or pasture that has not been tended within the last 2 years and that has less than 10 percent stocking with live trees.

**Improved Pasture** -- Land that is currently maintained and used for grazing. Evidence of maintenance, besides the degree of grazing, includes condition of fencing, presence of stock ponds, periodic brush removal, seeding, irrigation, or mowing.

**Inclusion** – An area that would generally would be recognized as a separate condition, except that it is not large enough to qualify. For example, a ½ acre pond within a forested stand.

**Industrial Wood** – All roundwood products, except firewood.

**Inspection crew** – a crew of qualified QC/QA individuals whose primary responsibility is the training, certification and inspection of production crews.

**Land Area** – As defined by the Bureau of the Census: The area of dry land and land temporarily or partially covered by water such as marshes, swamps, and river flood plains (omitting tidal flats below mean tide); streams, sloughs, estuaries and canals less than 200 feet in width, and ponds less than 4.5 acres in area.

**Macroplot** – A circular, fixed area plot with a radius of 58.9 feet. Macroplots may be used for sampling relatively rare events.

**Maintained Road** – Any road, hard topped or other surfaces, that is plowed or graded periodically and capable of use by a large vehicle. Rights-of-way that are cut or treated to limit herbaceous growth are included in this area.

**Marsh** – Low, wet areas characterized by heavy growth of weeds and grasses and an absence of trees.

**Measurement Quality Objective (MQO)** – Describes the acceptable tolerance for each data element. MQOs consist of two parts: a statement of the tolerance and a percentage of time when the collected data are required to be within tolerance.

**Merchantable Top** – The point on the bole of trees above which merchantable material cannot be produced. Merchantable top is 1.5 inches for woodland species and 4.0 inches for all other species.

**Microplot** – A circular, fixed-radius plot with a radius of 6.8 feet that is used to sample trees less than 5.0 inches at DBH, as well as other vegetation.

**MORTALITY** – Remeasure trees and saplings that were alive at the time of the last visit, but are now dead. Does not include trees or saplings that have been utilized.

**National Forest Land** – Federal lands which have been legally designated as National Forests or purchase units, and other lands under the administration of the Forest Service, including experimental areas and Bankhead-Jones Title III lands.

**Native American (Indian) Land** – Tribal lands held in fee, or trust, by the Federal government but administered for Indian tribal groups and Indian trust allotments. This land is considered “Private Lands”, Owner Group 40.

**Non-census Water** – Bodies of water from 1 to 4.5 acres in size and water courses from 30 feet to 200 feet in width.

**Nonforest Land** -- Land that does not support, or has never supported, forests, and lands formerly forested where use for timber management is precluded by development for other uses. Includes areas used for crops, improved pasture, residential areas, city parks, improved roads of any width and adjoining rights-of-way, power line clearings of any width, and noncensus water. If intermingled in forest areas, unimproved roads and nonforest strips must be more than 120.0 feet wide, and clearings, etc., more than one acre in size, to qualify as nonforest land.

**Nonstockable** – Areas of forest land that are not capable of supporting trees because of the presence of rock, water, etc.

**Other Federal Lands** – Federal land other than National Forests. These include lands administered by the USDI Bureau of Land Management, USDI National Park Service, USDI Fish and Wildlife Service, Department of Defense, Department of Energy, Army Corps of Engineers, and military bases.

**OWNER CLASS** -- A variable that classifies land into fine categories of ownership.

**OWNER GROUP** – A variable that classifies land into broad categories of ownership; Forest Service, Other Federal Agency, State and Local Government, and Private. Differing categories of Owner Group on a plot require different conditions.

**Phase 1 (P1)** – FIA activities done as part of remote-sensing and/or aerial photography.

**Phase 2 (P2)** – FIA activities done on the network of ground plots formerly known as FIA plots.

**Phase 3 (P3)** – FIA activities done on a subset of Phase 2 plots formerly known as Forest Health Monitoring plots. Additional ecological indicator information is collected from Phase 3 plots.

**Plot** – A cluster of four subplots that samples approximately 1/6 acre. The subplots are established so that subplot 1 is centered within the sample and the centers of subplots 2, 3, and 4 are located 120.0 feet from the center of subplot 1 at azimuths of 360, 120, and 240 degrees, respectively. Each subplot has an associated microplot and macroplot.

**PRIVATE OWNER INDUSTRIAL STATUS** – Indicates whether Private land owners own and operate a wood processing plant.

**Production crew** – a crew containing at least one certified individual. The crew is involved in routine installation of plots.

**Production plot** – A plot measured by a production crew. These plots may also be used for training purposes.

**Red Knot** – Visible branches, stubs or sockets that are from living branches or branches that have recently died. They are inter-grown with the surrounding wood and contain no rot.

**Reference plot (off grid)** – A plot that is used for crew certification. These plots are NOT included in the ongoing inventory process and data from these plots do not become part of the standard inventory data base. To ensure that these plots do not enter into the inventory data base, they are assigned plot numbers outside the normal range of production plots or other invalid plot identification information such as an invalid STATE code (STATECD).

**REGENERATION STATUS** – A stand descriptor that indicates whether a stand has been naturally or artificially regenerated.

**Reserved Land** – Land that is withdrawn from timber utilization by a public agency or by law such as national parks, national monuments and designated wilderness areas on federal lands. State parks are not usually classified as reserved.

**RESERVE STATUS** – An indication of whether the land in a condition has been reserved.

**ROTTEN/MISSING CULL** – An assessment of the rotten, missing, or otherwise defective portions of a tree bole that are unsuitable for industrial wood products. Cubic-foot cull is expressed as a percentage of the entire bole.

**Saplings** – Live trees 1.0 to 4.9 inches DBH.

**Seedlings** – Live trees less than 1.0 DBH. Conifer seedlings must be at least 6.0 inches in length and less than 1.0 inch at DBH in order to qualify for tallying, except Longleaf pine must be at least 0.5 in at the root collar. Hardwood seedlings must be at least 12.0 inches in length and less than 1.0 inch at DBH in order to qualify for tallying.

**Softwoods** – Coniferous trees, usually evergreen having needles or scale-like leaves.

**STAND AGE** – A stand descriptor that indicates the average age of the live trees not overtopped in the predominant stand size-class of a condition.

**STAND DENSITY** – A stand descriptor that indicates the relative tree density of a condition class. The classification is based on the number of stems/unit area, basal area, tree cover, or stocking of all live trees in the condition which are not overtopped, compared to any previously defined condition class tree density.

**STAND SIZE** – A stand descriptor that indicates which size-class of trees that are not overtopped constitutes the majority of stocking in the stand.

**State, County and Municipal Lands** – Lands owned by states, counties, and local public agencies or municipalities, or lands leased to these government units for 50 years or more.

**Stocking** – The relative degree of occupancy land by trees, measured as basal area or the number of trees in a stand by size or age and spacing, compared to the basal area or number of trees required to fully utilize the growth potential of the land; that is, the stocking standard.

**Subplot** – A circular, fixed-area plot with a radius of 24.0 feet. Each subplot represents  $\frac{1}{4}$  of the fixed plot sample unit.

**TOTAL LENGTH** – The total length of the tree, recorded to the nearest 1.0 foot from ground level to the tip of the apical meristem. For trees growing on a slope, measure on the uphill side of the tree. If the tree has a broken or missing top, the total length is estimated to what the length would be if there were no missing or broken top. Forked trees should be treated the same as unforked trees

**Training (practice) plot** – A plot established for training or certification purposes only. It is NOT a plot in the ongoing inventory process and data from these plots do not become part of the standard inventory data base. To ensure that these plots do not enter into the inventory data base, they are assigned plot numbers outside the normal range of production plots or other invalid plot identification information such as an invalid STATE code (STATECD).

**Transition Zone** – An area where a distinct boundary between two or more different conditions cannot be determined.



## Appendix 7. Tolerance / MQO / Value / Units Table

Core optional variables are in italics. n/a is not applicable.

Variable Name	Tolerance	MQO	Values	Units	Factor
<b>General Description</b>					
New Subplot Location	+/- 7 feet	at least 95% of the time	n/a	feet	10
New Microplot Location	+/- 1 foot	at least 95% of the time	n/a	feet	10
<b>Plot Level Data</b>					
STATE	No errors	at least 99% of the time	Appendix 1	n/a	5
COUNTY	No errors	at least 99% of the time	Appendix 1	n/a	5
PLOT NUMBER	No errors	at least 99% of the time	00001 to 99999	n/a	5
PLOT STATUS	No errors	at least 99% of the time	1 to 3	n/a	5
PLOT NONSAMPLED REASON	No errors	at least 99% of the time	01 to 03 and 05 to 11	n/a	1
SUBPLOTS EXAMINED	No errors	at least 90% of the time	1, 4	n/a	
SAMPLE KIND	No errors	at least 99% of the time	1 to 3	n/a	5
PREVIOUS PLOT NUMBER	No errors	at least 99% of the time	00001 to 99999	n/a	
FIELD GUIDE VERSION	No errors	at least 99% of the time	4.0	n/a	1
YEAR	No errors	at least 99% of the time	> 2003	year	1
MONTH	No errors	at least 99% of the time	Jan – Dec (01 – 12)	month	1
DAY	No errors	at least 99% of the time	01 to 31	day	1
DECLINATION	No errors	at least 99% of the time	+/- 50	degrees	
HORIZONTAL DISTANCE TO IMPROVED ROAD	No errors	at least 90% of the time	1 to 9	n/a	1
WATER ON PLOT	No errors	at least 90% of the time	0 to 5, 9	n/a	1
QA STATUS	No errors	at least 99% of the time	1 to 7	n/a	1
CREW NUMBER	No errors	at least 99% of the time	NRS 240001-249999 SRS 330001-339999 RMRS 220001-229999 PNW 260001-269999	n/a	1
GPS UNIT	No errors	at least 99% of the time	0 to 4	n/a	1
GPS SERIAL NUMBER	No errors	at least 99% of the time	000001 to 999999	n/a	1
GPS DATUM	No errors	at least 99% of the time	NAD27, NAD83, WGS84	n/a	
COORDINATE SYSTEM	No errors	at least 99% of the time	1, 2	n/a	
LATITUDE DEGREES	No errors	at least 99% of the time	0-90	degrees	1
LATITUDE MINUTES	No errors	at least 99% of the time	1 – 59	minutes	1
LATITUDE SECONDS	+/- 140 ft	at least 99% of the time	0.00 – 59.99	seconds	1
LONGITUDE DEGREES	No errors	at least 99% of the time	1-180	degrees	1
LONGITUDE MINUTES	No errors	at least 99% of the time	1 – 59	minutes	1
LONGITUDE SECONDS	+/- 140 ft	at least 99% of the time	0.00 – 59.99	seconds	1
UTM ZONE	No errors	at least 99% of the time	Number varies from 2 in Alaska to 19 on the East Coast. The letter varies from Q in Hawaii to W in Alaska	n/a	
EASTING (X) UTM	+/- 140 ft	at least 99% of the time	0000000-9999999		
NORTHING (Y) UTM	+/- 140 ft	at least 99% of the time	0000000-9999999		
AZIMUTH TO PLOT CENTER	+/- 3 degrees	at least 99% of the time	000 at plot center 001 to 360 not at plot center	degrees	1
DISTANCE TO PLOT CENTER	+/- 6 ft	at least 99% of the time	000 at plot center 001 to 200 if a Laser range finder not used 001 to 999 if a Laser range finder is used	feet	1
GPS ELEVATION		at least 99% of the time	-00100 to 20000	feet	1
GPS ERROR	No errors	at least 99% of the time	000 to 999 071 to 999 if an error < 70 cannot be obtained	feet	1
NUMBER OF READINGS	No errors	at least 99% of the time	001 to 999	n/a	1
GPS FILENAME	No errors	at least 99% of the time	English words, phrases and numbers	n/a	
MACROPLOT BREAKPOINT DIAMETER	No errors	at least 99% of the time	21, 24, and 30	inches	
PLOT NOTES	n/a	n/a	English, alpha-numeric	n/a	1 to 5
SRS CYCLE	No errors	At least 99% of the time	01 to 99	n/a	1
SRS SUBCYCLE	No errors	At least 99% of the time	1 to 5	n/a	1
SRS PHASE	No errors	At least 99% of the time	2, 3	n/a	1
SRS PLOT IN CORRECT COUNTY?	No errors	At least 99% of the time	0 or 1	n/a	1
SRS CORRECT COUNTY	No errors	at least 99% of the time	Appendix 1	n/a	1

Variable Name	Tolerance	MQO	Values	Units	Factor
SRS PAST YEAR	No errors	At least 99% of the time	< 2003	n/a	1
SRS PAST MONTH	No errors	At least 99% of the time	01 - 12	n/a	1
SRS PAST DAY	No errors	At least 99% of the time	01- 31	n/a	1
SRS NUMBER OF ACCESSIBLE FORESTLAND CONDITIONS	No errors	at least 99% of the time	0 to 9	n/a	1
SRS PLOT ACCESSIBILITY	No errors	at least 99% of the time	1-9	n/a	1
SRS GPS STATUS	No errors	At least 99% of the time	1, 8, 9	n/a	1
<b>Condition Class Information</b>					
CONDITION CLASS NUMBER	No errors	at least 99% of the time	1 to 9	n/a	1
CONDITION CLASS STATUS	No errors	at least 99% of the time	1 to 5	n/a	5
CONDITION NONSAMPLED REASON	No errors	at least 99% of the time	01, 02, 03, 10, 11	n/a	1
RESERVED STATUS	No errors	at least 99% of the time	0, 1	n/a	3
OWNER GROUP	No errors	at least 99% of the time	10, 20, 30, 40	n/a	3
FOREST TYPE	No errors	at least 99% of the time in group at least 95% of the time in type no MQO when STAND SIZE CLASS = 0	Appendix 2	n/a	5
STAND SIZE CLASS	No errors	at least 99% of the time	0 to 6	class	5
REGENERATION STATUS	No errors	at least 99% of the time	0, 1	n/a	5
TREE DENSITY	No errors	at least 99% of the time	1 to 3	n/a	1
OWNER CLASS	No errors	at least 99% of the time	11-13; 21-25; 31-33; 41-45	class	2
PRIVATE OWNER INDUSTRIAL STATUS	No errors	at least 99% of the time	0, 1	n/a	1
ARTIFICIAL REGENERATION SPECIES	No errors	at least 99% of the time	Appendix 3	n/a	1
STAND AGE	+/- 10%	at least 95% of the time	000 to 997, 998, 999	year	5
DISTURBANCE 1	No errors	at least 99% of the time	00; 10-12; 20-22; 30-32;40-46; 50-54; 60; 70; 80; 90-95; 9999	n/a	5
DISTURBANCE YEAR 1	+/- 1 yr for 5-yr measure. cycles +/ 2 yrs for > 5-yr measure. cycles	at least 99% of the time	Since the previous plot visit, or the past 5 years for plots visited for the first time; 9999 if disturbance occurs continuously over time	year	1
DISTURBANCE 2	No errors	at least 99% of the time	00; 10-12; 20-22; 30-32;40-46; 50-54; 60; 70; 80; 90-95; 9999	n/a	5
DISTURBANCE YEAR 2	+/- 1 yr for 5-yr measure. cycles +/ 2 yrs for > 5-yr measure. cycles	at least 99% of the time	Since the previous plot visit, or the past 5 years for plots visited for the first time; 9999 if disturbance occurs continuously over time	year	1
DISTURBANCE 3	No errors	at least 99% of the time	00; 10-12; 20-22; 30-32;40-46; 50-54; 60; 70; 80; 90-95; 9999	n/a	5
DISTURBANCE YEAR 3	+/- 1 yr for 5-yr measure. cycles +/ 2 yrs for > 5-yr measure. cycles	at least 99% of the time	Since the previous plot visit, or the past 5 years for plots visited for the first time; 9999 if disturbance occurs continuously over time	year	1
TREATMENT 1	No errors	at least 99% of the time	00, 10, 20, 30, 40, 50	n/a	5
TREATMENT YEAR 1	+/- 1 yr for 5-yr measure. cycles +/ 2 yrs for > 5-yr measure. cycles	at least 99% of the time	Since the previous plot visit, or the past 5 years for plots visited for the first time	year	1
TREATMENT 2	No errors	at least 99% of the time	00, 10, 20, 30, 40, 50	n/a	5
TREATMENT YEAR 2	+/- 1 yr for 5-yr measure. cycles +/ 2 yrs for > 5-yr measure. cycles	at least 99% of the time	Since the previous plot visit, or the past 5 years for plots visited for the first time	year	1
TREATMENT 3	No errors	at least 99% of the time	00, 10, 20, 30, 40, 50	n/a	5
TREATMENT YEAR 3	+/- 1 yr for 5-yr measure. cycles +/ 2 yrs for > 5-yr measure. cycles s	at least 99% of the time	Since the previous plot visit, or the past 5 years for plots visited for the first time	year	1
PHYSIOGRAPHIC CLASS	No errors	at least 80% of the time	xeric: 11, 12, 13, 19 mesic: 21, 22, 23, 24, 25, 29 hydric: 31, 32, 33, 34, 35, 39	n/a	3

Variable Name	Tolerance	MQO	Values	Units	Factor
PRESENT NONFOREST LAND USE	No errors	at least 99% of the time	10-15; 20; 30-33; 40	n/a	
SRS PRESENT LAND USE	No errors	At least 99% of the time	01-02; 10-17; 20; 30-34; 40-45; 91; 92; 99	n/a	5
SRS TRACT TOTAL ACRES	No errors	At least 99% of the time	00001- 99999	n/a	1
SRS TRACT PERCENT FOREST	No errors	At least 99% of the time	001- 100	n/a	1
SRS STAND STRUCTURE	No errors	At least 99% of the time	0 - 2	n/a	1
SRS OPERABILITY	No errors	At least 99% of the time	0 - 6	n/a	1
SRS CONDITION SITE CLASS	+/- 1 class	At least 99% of the time	0 - 7	n/a	5
SRS FIRE	No errors	At least 99% of the time	0,1	n/a	1
SRS GRAZING	No errors	At least 99% of the time	0,1	n/a	1
SRS CUTTING TYPE 1, 2, 3	No errors	At least 99% of the time	11-16		
<b>Subplot Information</b>					
SUBPLOT NUMBER	No errors	at least 99% of the time	1 to 4	n/a	1
SUBPLOT/ MACROPLOT STATUS	No errors	at least 99% of the time	1 to 4	n/a	5
SUBPLOT NONSAMPLED REASON	No errors	at least 99% of the time	01 to 05, 10, 11	n/a	1
SUBPLOT CENTER CONDITION	No errors	at least 99% of the time	1 to 9	n/a	5
MICROPLOT CENTER CONDITION	No errors	at least 99% of the time	1 to 9	n/a	5
SUBPLOT SLOPE	+/- 10 %	at least 90% of the time	000, 005 to 155	percent	1
SUBPLOT ASPECT	+/- 10 degrees	at least 90% of the time	000 to 360	degrees	1
SNOW/WATER DEPTH	+/- 0.5 ft	at the time of measurement	0.0 to 9.9	feet	1
SUBPLOT/ MACROPLOT CONDITION LIST	No errors	at least 99% of the time	1000 to 9876	n/a	1
SRS NONNATIVE INVASIVE PEST PLANTS	No errors	At least 90% of the time	0000, see section 3.10	n/a	1
SRS NONNATIVE INVASIVE PEST PLANT % COVER	No errors	At least 90% of the time	1 - 5	n/a	1
<b>Boundary Data</b>					
SUBPLOT NUMBER	No errors	at least 99% of the time	1 to 4	n/a	1
PLOT TYPE	No errors	at least 99% of the time	1 to 4	n/a	1
BOUNDARY CHANGE	No errors	at least 99% of the time	0 to 3	n/a	1
CONTRASTING CONDITION	No errors	at least 99% of the time	1 to 9	n/a	1
LEFT AZIMUTH	+/- 5 degrees	at least 90% of the time	001 to 360	degrees	3
CORNER AZIMUTH	+/- 5 degrees	at least 90% of the time	000 to 360	degrees	3
CORNER DISTANCE	+/- 1 ft	at least 90% of the time	microplot: 01 to 07 (6.8 ft actual limiting distance) subplot: 01 to 24 macroplot: 01 to 59 (58.9 ft actual limiting distance) hectare: 01 to 185	feet	3
RIGHT AZIMUTH	+/- 5 degrees	at least 90% of the time	001 to 360	degrees	3
SRS BOUNDARY STATUS	No errors	At least 99% of the time	0, 1 or 2	n/a	1
<b>Tree and Sapling Data</b>					
SUBPLOT NUMBER	No errors	at least 99% of the time	1 to 4	n/a	1
TREE RECORD NUMBER	No errors	at least 99% of the time	000, 001 to 999	n/a	1
CONDITION CLASS NUMBER	No errors	at least 99% of the time	1 to 9	n/a	1
AZIMUTH	+/- 3 degrees	at least 90% of the time	001 to 360	degrees	1
HORIZONTAL DISTANCE	microplot: +/- 0.2 ft microplot woodland species: +/- 0.4 ft subplot: +/- 1.0 ft subplot woodland species: +/- 2.0 ft annular plot: +/- 3.0 ft annular plot woodland species: +/- 6.0 ft	at least 90% of the time	microplot: 00.1 to 06.8 subplot: 00.1 to 24.0 annular plot: 24.1 to 58.9	feet	1
PREVIOUS TREE STATUS	No errors	at least 95% of the time	1, 2	n/a	5
PRESENT TREE STATUS	No errors	at least 95% of the time	0 to 3	n/a	5

Variable Name	Tolerance	MQO	Values	Units	Factor
RECONCILE	No errors	at least 95% of the time	1 to 4: valid for new trees on the plot 5 to 9: valid for re-measured trees that no longer qualify as tally	n/a	5
STANDING DEAD	No errors	At least 99% of the time	0, 1	n/a	1
MORTALITY	No errors	at least 85% of the time	0, 1	n/a	
SPECIES	No errors	at least 99% of the time for genus at least 95% of the time for species	Appendix 3	n/a	2
DIAMETER	+/- 0.1 inch per 20.0 inch increment of measured diameter on all live trees and dead trees with DECAY CLASS = 1, 2 +/- 1.0 inch per 20.0 inch increment of measured diameter on dead trees with DECAY CLASS = 3, 4, 5 For woodland species: +/- 0.2 inch per stem	at least 95% of the time	001.0 to 999.9	inches	Saplings and snags=1; pole and saw timber=5
DRC STEM DIAMETER	+/- 0.2 inch per stem	at least 95% of the time	001.0 to 999.9	inch	5
DRC STEM STATUS	No errors	at least 95% of the time	1, 2	n/a	1
PAST NUMBER OF STEMS	No errors	at least 90% of the time	1 to 99	n/a	
CURRENT NUMBER OF STEMS	No errors	at least 90% of the time	1 to 99	n/a	1
DIAMETER CHECK	No errors	at least 99% of the time	0 to 2	n/a	1
ROTTEN / MISSING CULL	+/- 10%	at least 90% of the time	00 to 99	percent	2
TOTAL LENGTH	+/- 10% of true length	at least 90% of the time	005 to 400	feet	Saplings and snags=1; pole and saw timber=5
ACTUAL LENGTH	+/- 10% of true length	at least 90% of the time	005 to 400	feet	Saplings and snags=1; pole and saw timber=5
LENGTH METHOD	No errors	at least 99% of the time	1 to 3	n/a	1
CROWN CLASS	No errors	at least 85% of the time	1 to 5	n/a	2
UNCOMPACTED LIVE CROWN RATIO	+/- 10%	at least 90% of the time	00 to 99	percent	
COMPACTED CROWN RATIO	+/- 10%	at least 80% of the time	00 to 99	percent	1
DAMAGE LOCATION 1	+/- 1 location class	at least 80% of the time	0 to 9	class	
DAMAGE TYPE 1	No errors	at least 80% of the time	1-5; 11-13; 20-25; 31	n/a	
DAMAGE SEVERITY 1	+/- 1 valid class unless otherwise defined by the DAMAGE TYPE	at least 80% of the time	Defined for each DAMAGE TYPE	class	
DAMAGE LOCATION 2	+/- 1 location class	at least 80% of the time	0 to 9	class	
DAMAGE TYPE 2	No errors	at least 80% of the time	1-5; 11-13; 20-25; 31	n/a	
DAMAGE SEVERITY 2	+/- 1 valid class unless otherwise defined by the DAMAGE TYPE	at least 80% of the time	Defined for each DAMAGE TYPE	class	
CAUSE OF DEATH	No errors	at least 80% of the time	10 to 80	n/a	1
MORTALITY YEAR	+/- 1 year for 5-year measure. cycles +/- 2 years for > 5-year measure. cycles	at least 70% of the time	1994 or higher	year	1
DECAY CLASS	+/- 1 class	at least 90% of the time	1 to 5	class	1
LENGTH TO DIAMETER MEASUREMENT POINT	+/- 0.2 ft	at least 90% of the time	00.1 to 15.0	feet	1
ROUGH CULL	+/- 10 %	at least 90% of the time	00 to 99	percent	
DWARF MISTLETOE CLASS	+/- 1 class	at least 90% of the time	0 to 6	class	
TREE NOTES	n/a	n/a	English, alpha-numeric	n/a	n/a
SRS TREE CLASS	No errors	At least 90% of the time	2, 3, 4	n/a	5

Variable Name	Tolerance	MQO	Values	Units	Factor
SRS TREE GRADE	No errors	At least 90% of the time	1 to 5	n/a	2
PERCENT BOARD FOOT CULL	+/- 10%	At least 90% of the time	00 - 67	percent	2
SRS DISEASE	No errors	At least 80% of the time	0, 1, 2	n/a	1
SRS DIEBACK SEVERITY	+/- 1 class	At least 80% of the time	1 to 9	Class	1
SRS UTILIZATION CLASS	No errors	At least 99% of the time	1, 2	n/a	1
SRS SPECIES CODE	No errors	At least 99% of the time	00 - 04	n/a	1
SRS ABNORMAL TERMINATION	No errors	at least 99% of the time	0, 1	n/a	1
<b>Seedling Data</b>					
SUBPLOT NUMBER	No errors	at least 99% of the time	1 to 4	n/a	1
SPECIES	No errors	at least 90% of the time for genus at least 85% of the time for species	Appendix 3	n/a	1
CONDITION CLASS NUMBER	No errors	at least 99% of the time	1-9	n/a	1
SEEDLING COUNT	No errors for 5 or less per species +/- 20% over a count of 5	at least 90% of the time	001-999	number	1
<b>Site Tree Information</b>					
CONDITION CLASS LIST	No errors	at least 99% of the time	1000 to 9876	n/a	1
SPECIES	No errors	at least 99% of the time for genus at least 95% of the time for species	Appendix 3	n/a	1
DIAMETER	+/- 0.1 inch per 20 inches of diameter on trees with a measured diameter	at least 95% of the time	001.0 to 999.9	inches	1
SITE TREE LENGTH	+/- 10% of true length	at least 90% of the time	005 to 999	feet	1
TREE AGE AT DIAMETER	+/- 5 years	at least 95% of the time	001 to 999	year	1
SITE TREE NOTES	n/a	n/a	English, language words, phrases and numbers	n/a	1 to 5
SUBPLOT NUMBER	No errors	at least 99% of the time	1 to 4	n/a	1
AZIMUTH	+/- 10 degrees	at least 90% of the time	001 to 360	degrees	1
HORIZONTAL DISTANCE	+/-5 ft	at least 90% of the time	000.1 to 200.0	feet	1
SRS SITE CLASS	+/- 1 class	At least 99% of the time	0 - 7	n/a	1



Appendix 8. Tree Coding Guide

Previous Measurement	Present Measurement	PREVIOUS TREE STATUS	PRESENT TREE STATUS	RECONCILE	Standing Dead	CAUSE OF DEATH
<b>SAMPLE KIND 1 or 3</b>						
	Live 1.0+DBH/DRC		1			
	Dead 5.0+ DBH/DRC		2			
<b>SAMPLE KIND 2 (Remeasure)</b>						
Live 5.0+ DBH/DRC	Live 5.0+ DBH/DRC	1	1			
Live 1.0-4.9 DBH/DRC on microplot	Live 5.0+ DBH	1	1			
Live 1.0-4.9 DBH/DRC on microplot	Live 1.0-4.9 DBH/DRC on microplot	1	1			
Live 5.0+ DBH/DRC	Live but shrank < 5.0 and on microplot	1	1			
Live 1 inch +	Live but land no longer qualifies as forest	1	1			
Live 5.0+ DBH/DRC	Standing dead 5.0+	1	2		1	10-80
Live 5.0+ DBH/DRC	Down dead 5.0+	1	2		0	10-80
Live 1.0-4.9 DBH/DRC on microplot	Dead 1.0-4.9 DBH/DRC	1	2		0	10-80
Live 1.0-4.9 DBH/DRC on microplot	Dead 5.0+ (standing or down)	1	2		0 or 1	10-80
Live 1.0+ DBH/DRC	Cruiser unable to locate tree due to a weather (including geologic, such as landslide) or fire event & assume tree is down dead <b>or</b> you can see tree and it is dead and off the plot	1	2		0	30 or 50
Live 1.0+ DBH/DRC	Cut and left in the woods	1	2		0	80
Live 1 inch +	Dead and land no longer qualifies as forest (land clearing or conversion to nonforest land use)	1	2		0 or 1	10-80
Live 1.0+ DBH/DRC	Tree removed (cut and hauled away)	1	3			80
Live 1 inch +	Gone (cut and removed?) and land no longer qualifies as forest	1	3			80
Dead 5.0+ DBH/DRC	Dead standing 5.0 DBH/DRC	2	2		1	
Dead 5.0+ DBH/DRC	Dead down 5.0+	2	2		0	
Dead 5.0+ DBH/DRC	Dead DBH/DRC < 5.0	2	2		0	
Dead 5.0+ DBH/DRC	Cruiser is unable to locate tree due to a weather (including geologic) or fire event & assume it is down dead	2	2		0	
Dead 5.0+ DBH/DRC	Tree removed (cut and hauled away)	2	3			

Previous Measurement	Present Measurement	PREVIOUS TREE STATUS	PRESENT TREE STATUS	RECONCILE	Standing Dead	CAUSE OF DEATH
Live 5.0+ DBH/DRC	Tree shrank <5.0 and NOT on microplot	1	0	5		
Live 1.0-4.9 DBH/DRC	Tree shrank <1.0	1	0	5		
Live 1.0-4.9 DBH/DRC	Live 1.0-4.9 DBH/DRC, shouldn't have been tallied—beyond 6.8—cruiser error	1	0	7		
Live 5.0+ DBH/DRC	Live 5.0+ DBH/DRC, shouldn't have been tallied—beyond 24.0—cruiser error	1	0	7		
Live 1.0+ DBH/DRC	No longer a tally species	1	0	8		
	Tree moved off plot due to a geologic (e.g., slight earth movement) or weather event (e.g., hurricane) and you can still see it (Live before, live now)	1	0	6		
Live 1 inch +	Nonsampled area now	1	0	9		
Dead 5.0+ DBH/DRC	No longer a tally species	2	0	8		
	Tree moved off plot due to a geologic (e.g., small earth movement) or weather event (e.g., hurricane) and you can still see the tree	2	0	6		
Dead 5 inch +	Nonsampled area now	2	0	9		
Missed live	Live 1.0+ DBH/DRC	-	1	3		
< 5.0 live	5.0+ DBH/DRC live (not on the microplot)	-	1	1		
< 1.0 live	1.0-4.9 DBH/DRC live	-	1	1		
< 1.0 live	5.0+ DBH/DRC live (on the microplot) (Through growth)	-	1	2		
Nonsampled area before	Live 1 inch +	-	1	3		
Nonforest before	Forest now, Live 1 inch+	-	1	1		
Missed dead	Dead 5.0+ DBH/DRC	-	2	4	1	
Missed live	Dead 5.0+ DBH/DRC	-	2	3	1	10-80
< 5.0 live	5.0+ DBH/DRC dead (very rare)	-	2	1	0 or 1	10-80
Nonsampled area before	Standing Dead 5 inch+	-	2	3 or 4		
Nonforest before	Forest now, Standing Dead 5 inch+	-	2	1		

## Supplement A. Cull and Tree Grading Procedures

### CUBIC FOOT CULL PROCEDURES

Record the percentage of rotten and missing cubic-foot volume, to the nearest 1 percent. When estimating volume loss (tree cull), only consider the cull on the merchantable bole/portion of the tree, from a 1-ft stump to a 4-inch top. Do not include any cull estimate above actual length.

Rotten and missing volume loss is often difficult to estimate. Refer to supplemental disease and insect pests field guides and local defect guidelines as an aid in identifying damaging agents and their impact on volume loss. Use your best judgment and be alert to such defect indicators as the following:

- Cankers or fruiting bodies.
- Swollen or punky knots.
- Dull, hollow sound of bole (use regional standards).
- Large dead limbs, especially those with frayed ends.
- Sawdust around the base of the tree.
- Metal in tree (ex. signs, deerstands, fences, etc.)

**Cull portions of the tree that contain embedded metal objects (e.g., fencing, nails) and sections between metal objects that are less than 4 feet in length from the stump to the 4in top, (aluminum is okay).**

<b>Cubic-Foot Volume of Short Logs</b>										
DIB	Length of log or section (feet)									
midpoint	1	2	3	4	6	8	10	12	14	16
4	0.1	0.2	0.3	0.3	0.5	--	--	--	--	--
5	0.1	0.3	0.4	0.5	0.8	1.1	1.4	1.6	1.9	2.2
6	0.2	0.4	0.6	0.8	1.2	1.6	2.0	2.4	2.7	3.1
7	0.3	0.5	0.8	1.1	1.6	2.1	2.7	3.2	3.7	4.3
8	0.3	0.7	1.0	1.4	2.1	2.8	3.5	4.2	4.9	5.6
9	0.4	0.9	1.3	1.8	2.7	3.5	4.4	5.3	6.2	7.1
10	0.5	1.1	1.6	2.2	3.3	4.4	5.5	6.5	7.6	8.7
12	0.8	1.6	2.4	3.1	4.7	6.3	7.9	9.4	11.0	13.0
14	1.1	2.1	3.2	4.3	6.4	8.6	11.0	13.0	15.0	17.0
16	1.4	2.8	4.2	5.6	8.4	11.0	14.0	17.0	20.0	22.0
18	1.8	3.5	5.3	7.1	11.0	14.0	18.0	21.0	25.0	28.0
20	2.2	4.4	6.5	8.7	13.0	18.0	22.0	26.0	30.0	35.0
22	2.6	5.3	7.9	11.0	16.0	21.0	26.0	32.0	37.0	42.0
24	3.1	6.3	9.4	13.0	19.0	25.0	31.0	38.0	44.0	50.0
26	3.7	7.4	11.0	15.0	22.0	30.0	37.0	44.0	52.0	59.0
28	4.3	8.6	13.0	17.0	26.0	34.0	43.0	51.0	60.0	68.0
30	4.9	9.8	15.0	20.0	30.0	39.0	49.0	59.0	69.0	78.0
32	5.6	11.0	17.0	22.0	34.0	45.0	56.0	67.0	78.0	89.0
34	6.3	13.0	19.0	25.0	38.0	50.0	63.0	76.0	88.0	101.0
36	7.1	14.0	21.0	28.0	42.0	56.0	71.0	85.0	99.0	113.0
38	7.9	16.0	24.0	32.0	47.0	63.0	79.0	94.0	110.0	126.0
40	8.7	18.0	26.0	35.0	52.0	70.0	87.0	105.0	122.0	140.0

## BOARD FOOT CULL PROCEDURES

Record the percentage of rotten and missing board-foot volume, to the nearest 1 percent. When estimating board-foot cull, only consider the cull in the sawlog portion of the tree, from a 1-ft stump to a 7-inch top for pines, from a 1-ft stump to 9-inch top on hardwoods. Do not include any cull estimate above actual length. Board foot cull cannot be coded greater than 67 percent. If the actual amount of board foot cull is greater than 67 percent, then TREE CLASS ≠2, and board foot cull is not required.

Board-foot cull is the volume within the entire sawlog portion of all live trees that cannot be recovered for use as lumber because of rot, sweep or crook, or other defect. Cull volume includes the entire volume of sections that do not meet minimum log grade requirements. This includes all sections less than 8 feet in length and the cull volume within sawlogs. Board foot cull is assigned for those trees receiving a tree grade, according to the section length (in feet), from a 1-foot stump to a 7-inch top in softwood or 9 inch top in hardwood.

### Sweep and Crook

Estimate the length, small-end DIB, and sweep or crook departure of the affected section. If the length is 6 feet or less, treat as crook. To determine board-foot deduction, see the tables for sweep and crook in the appendix. If sweep or crook is so excessive that the section is cull, record the entire volume of the section as cull. This is the area within the heavy black lines of the sweep/crook tables.

### Other Board-Foot Cull

Determine the length and the small-end DIB of the section containing decay, missing wood, fork, etc. Estimate the percentage of the section that is unusable for lumber, ties, or timber, ignoring cull defect that could normally be removed in slabbing. Apply this percentage to the total volume contained in the section, as shown in the board foot cull table.

### Sawlog Stoppers

**Measure the main stem to the point above which no sawlog can be produced to meet log grade standards (size and soundness) and to a minimum top of 7.0 inches DOB for softwoods and 9.0 inches DOB for hardwoods.**

The sawlog cannot extend above a point where taper becomes excessive as evidenced by:

- (1) A fork with less than 8 foot sawlog above it (12 feet if this is the only log in the tree)
- (2) A limb with a base diameter equal to one half or more of the stem diameter below the limb, or a group of smaller limbs 2.0 inches or larger within a 1 foot section with equivalent diameter which collectively influence taper to the same degree.

Sawlog length should not extend above a sawlog section that does not meet minimum grade specifications and which has less than 8 feet of sawlog length above it (12 feet if this is the only log in the tree).

<b>Board-Foot Volume of Short Logs</b>										
DIB small end	Length of log or section (feet)									
	1	2	3	4	6	8	10	12	14	16
6	1	2	2	3	5	8	10	13	16	19
7	1	3	4	5	8	12	15	19	24	28
8	2	4	6	8	12	17	22	27	33	39
9	3	5	8	10	16	22	29	36	43	51
10	3	7	10	13	21	29	37	46	55	65
11	4	9	13	17	26	36	46	57	68	80
12	5	10	16	21	32	44	57	69	83	97
13	6	13	19	25	39	53	68	83	99	115
14	8	15	23	30	46	63	80	98	117	136
16	10	20	31	41	62	84	108	131	158	181
18	13	26	40	53	81	109	139	169	200	232
20	17	33	50	67	102	137	174	212	251	290
22	21	41	62	82	125	169	214	259	306	354
24	25	50	74	99	151	203	257	311	368	424
26	29	59	88	118	179	241	304	368	435	501
28	35	69	104	138	210	281	356	430	507	584
30	40	80	120	160	243	325	411	497	585	674
32	46	92	137	183	278	373	470	568	669	770
34	52	104	156	208	316	423	534	644	758	872
36	59	117	176	235	356	477	601	725	853	981
38	66	132	197	263	398	533	672	811	954	1096
40	73	146	220	293	443	593	747	902	1060	1218

Crook Deduction in Board Feet															
Crook departure (inches)	Crook length (feet)	Scaling diameter of section with crook (inches)													
		6	7	8	9	10	12	14	16	18	20	22	24	26	28
1	1	0	0	0	0	0	0	1	1	1	1	1	1	1	1
	2	0	0	0	1	1	1	1	1	1	2	2	2	2	2
	3	1	1	1	1	1	1	2	2	2	2	3	3	3	4
	4	1	1	1	1	1	2	2	3	3	3	4	4	4	5
	5	1	1	1	1	2	2	3	3	4	4	5	5	6	6
	6	1	1	2	2	2	3	3	4	5	5	6	6	7	8
2	1	0	0	0	1	1	1	1	1	1	2	2	2	2	3
	2	1	1	1	1	1	2	2	2	3	3	4	4	4	5
	3	1	1	2	2	2	3	3	4	4	4	6	6	7	7
	4	1	1	2	2	3	3	4	5	6	7	8	8	9	10
	5	1	2	2	3	3	4	5	6	8	8	10	10	11	13
	6	2	2	3	4	4	5	7	8	9	10	13	13	14	15
3	1	0	0	1	1	1	1	2	2	2	3	3	3	3	4
	2	1	1	2	2	2	2	3	4	4	5	5	6	7	7
	3	1	2	2	3	3	4	5	6	7	8	8	9	10	11
	4	2	2	3	3	4	5	6	8	9	10	10	12	13	15
	5	2	3	4	4	5	6	8	10	11	13	13	16	17	19
	6	2	3	4	5	6	8	10	12	14	15	15	19	20	23
4	1	1	1	1	1	1	2	2	2	3	3	3	4	4	5
	2	1	2	2	2	3	3	4	5	6	7	7	8	9	10
	3	1	2	3	3	4	5	7	8	9	10	10	12	13	15
	4	2	3	4	3	5	7	9	10	12	13	13	17	18	20
	5	2	3	5	6	7	9	11	13	15	17	17	21	22	25
	6	3	5	6	7	8	11	13	15	18	20	20	25	27	30
5	1	-	-	1	2	2	2	3	3	4	4	4	5	6	6
	2	-	-	2	3	4	4	5	6	7	8	8	10	11	12
	3	-	-	4	4	5	7	8	10	11	12	12	16	17	19
	4	-	-	5	6	6	9	11	13	15	17	17	21	22	25
	5	-	-	6	7	8	11	13	16	19	21	21	26	28	31
	6	-	-	8	9	10	13	16	19	23	26	26	32	34	36
6	1	-	-	-	2	2	2	3	4	4	5	5	6	7	8
	2	-	-	-	3	4	5	6	7	9	10	10	13	13	15
	3	-	-	-	4	6	8	10	12	13	15	15	19	20	22
	4	-	-	-	7	8	10	13	15	18	20	20	25	27	30
	5	-	-	-	9	10	13	16	19	23	25	25	32	34	38
	6	-	-	-	11	13	16	20	23	27	31	31	38	41	45
8	1	-	-	-	-	-	3	5	5	6	7	7	8	9	10
	2	-	-	-	-	-	7	9	10	12	13	13	17	18	20
	3	-	-	-	-	-	10	13	16	18	20	20	25	27	30
	4	-	-	-	-	-	14	17	20	24	27	27	33	36	40
	5	-	-	-	-	-	17	22	26	30	34	34	42	45	50
	6	-	-	-	-	-	21	26	31	36	41	41	51	54	60
10	1	-	-	-	-	-	-	-	6	7	8	8	10	11	12
	2	-	-	-	-	-	-	-	12	14	16	16	21	23	25
	3	-	-	-	-	-	-	-	19	22	25	25	31	34	37
	4	-	-	-	-	-	-	-	26	29	34	34	41	45	49
	5	-	-	-	-	-	-	-	32	37	42	42	52	57	62
	6	-	-	-	-	-	-	-	39	45	51	51	63	69	75

In dashed (-) spaces, crook exceeds the maximum that is allowed and culls the entire section. Boxed spaces are sound for softwoods, but cull for hardwoods.

Sweep Deduction in Board Feet															
Sweep departure (inches)	Sweep length (feet)	Scaling diameter of section with sweep (inches)													
		6	7	8	9	10	12	14	16	18	20	22	24	26	28
2	6	1	1	2	2	3	3	4	5	6	6	7	8	9	9
	8	1	1	2	2	3	4	5	5	6	7	8	8	9	10
	10	1	1	2	2	3	4	4	5	6	7	7	8	9	10
	12	1	1	2	2	2	3	4	4	5	6	6	6	7	8
	14	1	1	1	1	1	2	2	2	3	3	3	4	4	5
16	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3	6	2	3	3	5	5	6	7	9	10	11	13	14	15	17
	8	2	3	4	6	6	7	9	10	12	14	15	17	19	20
	10	2	4	5	6	6	8	10	12	13	15	17	19	20	22
	12	3	4	5	7	7	9	11	12	14	16	18	19	21	23
	14	3	4	5	7	7	9	10	12	14	16	17	19	21	23
16	3	4	5	6	6	8	10	11	13	14	16	18	19	21	
4	6	3	4	5	6	7	8	11	13	15	17	18	20	22	24
	8	4	5	6	7	9	11	14	16	18	21	23	25	28	30
	10	5	6	8	9	10	13	16	19	21	24	27	29	32	35
	12	5	7	8	10	12	14	18	20	23	26	29	32	35	38
	14	6	8	9	11	12	16	19	22	25	28	31	35	38	41
16	6	8	10	11	13	16	19	23	26	29	32	35	39	42	
5	6	-	5	6	8	9	11	14	16	19	22	24	27	29	32
	8	5	7	8	10	12	15	18	21	24	27	31	34	37	40
	10	6	8	10	12	14	18	21	25	29	33	36	40	44	48
	12	8	10	12	12	16	20	25	29	33	37	41	45	50	54
	14	9	11	13	16	18	22	27	32	36	41	45	50	54	59
16	10	12	15	17	20	24	29	34	39	44	48	53	58	63	
6	6	-	-	8	9	11	14	17	20	24	27	30	33	36	39
	8	-	-	11	12	14	18	22	26	30	34	38	42	46	50
	10	-	10	13	15	18	23	27	32	36	41	46	51	56	60
	12	-	12	15	18	21	26	32	37	42	48	53	58	64	69
	14	11	15	18	20	23	29	36	41	47	53	59	65	71	77
16	13	16	20	23	26	32	39	45	52	58	64	71	77	83	
7	6	-	-	-	11	13	16	21	24	28	32	36	39	43	47
	8	-	-	-	15	17	22	27	31	36	41	46	51	56	60
	10	-	-	-	19	21	27	33	39	44	50	56	62	67	73
	12	-	-	-	22	25	32	39	45	52	58	65	71	78	84
	14	-	-	-	25	29	36	44	51	58	66	73	81	88	95
16	-	-	24	28	33	40	49	57	64	72	80	88	96	104	
8	6	-	-	-	-	-	19	24	28	33	37	41	46	50	54
	8	-	-	-	-	-	25	31	37	42	48	54	59	65	70
	10	-	-	-	-	25	32	39	46	52	59	66	72	79	86
	12	-	-	-	-	30	37	46	53	61	69	76	84	92	100
	14	-	-	-	-	34	43	52	61	69	78	87	96	105	113
16	-	-	-	34	39	48	58	68	77	87	97	106	116	125	
9	6	-	-	-	-	-	-	27	32	37	42	47	52	57	62
	8	-	-	-	-	-	29	36	42	48	55	61	68	74	80
	10	-	-	-	-	-	37	44	52	60	67	75	83	91	99
	12	-	-	-	-	-	43	52	61	70	80	88	97	106	115
	14	-	-	-	-	-	50	61	71	81	91	101	111	121	131
16	-	-	-	-	-	57	68	79	90	102	113	124	135	146	

In dashed (-) spaces, excessive sweep culls the entire section. Boxed spaces are sound for softwoods, but cull for hardwoods.

TREE GRADE PROCEDURES			
HARDWOOD TREE GRADES			
GRADING FACTORS	GRADE 1	GRADE 2	GRADE 3
Length of grading zone (ft)	Butt 16	Butt 16	Butt 16
Length of grading section <sup>a</sup> (ft)	Best 12	Best 12	Best 12
Minimum DBH (in)	16 <sup>b</sup>	13	11
Minimum DIB at the top of the grading section (in)	13 <sup>b</sup> 16 20	11 <sup>c</sup> 12	8
Clear cuttings on 3rd best face <sup>d</sup> minimum length (ft)	7 5 3	3 3	2
number on face (max)	2	2 3	unlimited
yield in face length (min)*	5/6	4/6	3/6
Cull deduction, including crook and sweep but excluding shake, maximum w/in grading section (%)	9	9 <sup>e</sup>	50

- <sup>a</sup> Whenever a 14- or 16-ft section of the butt log is better than the best 12-ft section, the grade of the longer section will become the grade of the tree. This longer section, when used, is the basis for determining the grading factors, such as diameter and cull deduction.
- <sup>b</sup> In basswood and ash, DIB at the top of the grading section may be 12-in and DBH may be 15-in.
- <sup>c</sup> Grade 2 trees can be 10-in DIB at the top of the grading section if otherwise meeting surface requirements for small grade 1's.
- <sup>d</sup> A clear cutting is a portion of a face free of defects, extending the width of the face. A face is one-fourth of the surface of the grading section as divided lengthwise.
- <sup>e</sup> 15% crook and sweep, or 40% total cull deduction are permitted in grade 2 if size and surface of grading section qualify as grade 1. If rot shortens the required clear cuttings to the extent of dropping the butt log to grade 2, do not drop the tree's grade to 3 unless the cull deduction for rot is greater than 40%.

*Minimum Yield in Face Length			
Face Length	Grade 1 Min. Yield	Grade 2 Min. Yield	Grade 3 Min. Yield
12-ft	10-ft	8-ft	6-ft
14-ft	11.7-ft	9.3-ft	7-ft
16-ft	13.3-ft	10.7-ft	8-ft

HARDWOOD TIE AND TIMBER GRADE 4	
GRADING FACTORS	SPECIFICATIONS
Length of grading zone (ft)	Butt 16
Scaling diameter (in)	8-in DIB and larger
Length, w/o trim (ft)	12-ft and longer
Clear cuttings	No requirements (not graded on cutting basis)
Maximum sweep allowance	One-fourth DIB of small end for half logs, and one-half DIB for logs 16-ft long
Sound surface defects -	
Single knots	Any number, if none has an average collar <sup>a</sup> diameter that is more than one-third of the log diameter at the point of occurrence.
Whorled knots	Any number, provided the sum of the collar diameters does not exceed one-third the log diameter at the point of occurrence.
Knots	Any number not exceeding knot specifications, if they do not extend more than 3-in into the contained tie or timber.
Unsound surface defects <sup>b</sup>	Any number and size, if they do not extend into contained tie or timber. If they extend into contained tie or timber, they shall not exceed size, number, and depth of limits for sound defects.

<sup>a</sup> Knot collar is the average of the vertical and horizontal diameters of the limb, or knot swelling, as measured flush with the surface of the log.

<sup>b</sup> Interior defects are not visible in standing trees. They are considered in grading cut logs. No interior defects are permitted except one shake not more than one-third the width of the contained tie or timber, and one split not more than 5-in long.

#### HARDWOOD TREE GRADE 5

Record TREE GRADE 5 for hardwood species that do not meet the length of grading zone requirement for TREE GRADE 1-4, but do have either an upper 12-foot log or 2 non-contiguous 8-foot logs, and the total board foot cull deduction is less than 67%.

These logs must still meet the size, soundness and surface yield requirements for a grade 1-4 log. The only difference is that the length of the grading zone extends beyond the butt 16-foot log.

Since these logs are in the upper portion of the tree, determining the surface yield is impractical. When determining if TREE GRADE = 5, simply make sure the log appears to meet the size and soundness requirements of a TREE GRADE 4 (no internal rot). If it is clear the upper log does have internal rot, then it must be examined further to determine if it can at least meet the size, soundness and surface yield requirements of a TREE GRADE 3 (the log must be at least 8 inches DIB, with no more than 50% board foot cull in the section, at least 3/6 of the section length clear of defects, and at least 2 feet between defects.)

Log abnormalities that are defects in factory logs include the following:

Adventitious bud clusters	Limb
Bulge, butt or stem	Knots
High bumps	Knot overgrowths
Burl	Low bumps
Butt scar	Overgrowths following insect damage or bird peck*
Canker	Seams, if not superficial
Conk	Wounds extending into the bole
Flutes, if not superficial	
Holes extending into the bole	
Embedded metal (fence)	

Bird pecks: There must be four bird pecks within a square foot to affect the tree grade. First, determine the tree grade without the bird pecks. If the tree grade is determined to be 1 or 2, then down grade the tree by one grade. If the tree graded out to be a 3 or 4 without the bird pecks, then ignore them as defects and record the initial tree grade.

Abnormalities not ordinarily limiting cuttings are butt swell, flanges and surface rise.

**SOUTHERN PINE TREE GRADES**

<b>SOUTHERN PINE TREE GRADES</b>			
<b>All pines except eastern white pine. Includes eastern red cedar.</b>			
<b>FACE LENGTH</b>	<b>GRADE 1</b>	<b>GRADE 2</b>	<b>GRADE 3</b>
Butt 16-ft*	3 or 4 clear faces	1 or 2 clear faces	No clear faces

After the tentative grade is established, the tree will be **reduced one grade** for each of the following:

**Sweep -** Degrade any tentative Grade 1 or 2 tree one grade if sweep in the lower 12-ft of the grading section amounts to 3 or more inches and equals or exceeds one-fourth the DBH.

**Heart rot -** Degrade any tentative Grade 1 or 2 tree one grade if conks, punk knots, or other evidence of advanced heart rot is found anywhere on the tree stem.

**Note -** No tree can be degraded below Grade 3, provided the total scaling deductions for sweep and/or rot do not exceed two-thirds the gross scale of the tree. Trees with total scaling deductions in excess of two-thirds are classified as cull (Tree Class 3 or 4).

A face is one-fourth the circumference of the 16-ft grading section and extends the full length of the grading section. Clear faces are those free from knots measuring more than 1/2-in in diameter, overgrown knots of any size, and holes more than 1/4-in in diameter. Faces may be rotated, if necessary, to obtain the maximum number of clear faces on the grading section.

\*Note: Only grade the length of the log up to a 7-inch top DOB. The 7-inch top DOB must be between 12 and 16 feet off of the 1-ft stump to be TREE CLASS 2.

**SOUTHERN PINE TREE GRADE 5**

Record TREE GRADE 5 for southern pine species that do not have a 12-foot log in the butt 16-foot grading section due primarily to poor form, but do have either an upper 12-foot log or 2 non-contiguous 8-foot logs, and the total board foot cull deduction is less than 67%.

EASTERN WHITE PINE TREE GRADES

EASTERN WHITE PINE TREE GRADES				
GRADING FACTORS	GRADE 1	GRADE 2	GRADE 3	GRADE 4
Minimum DBH (in)	9	9	9	9
Maximum weevil injury in butt 16-ft section (number)	None	None	2 Injuries	No limit
Minimum face requirements on butt 16-ft section	Two full length or four 50% length good faces <sup>1</sup> . (In addition, knots on balance of faces shall not exceed size limitations for Grade 2 sections.)	NO GOOD FACES REQUIRED. Maximum diameter of knots on 3 best faces: <b>SOUND RED KNOTS</b> not to exceed 1/6 of scaling diameter or 3-in maximum <sup>2</sup> . <b>DEAD OR BLACK KNOTS</b> , in-cluding over-grown knots, not to exceed 1/12 scaling diameter and 1-1/2-in maximum.	NO GOOD FACES REQUIRED. Maximum diameter of knots on 3 best faces: <b>SOUND RED KNOTS</b> not to exceed 1/3 of scaling diameter of 5-in maximum <sup>2</sup> . <b>DEAD OR BLACK KNOTS</b> , in-cluding over-grown knots, not to exceed 1/6 scaling diameter and 2-1/2-in maximum.	Includes all trees not qualifying for Grade 3 or better and judged to have at least 1/3 of their gross volume in sound wood suitable for manufacture into standard lumber.
Maximum sweep or crook in butt 16-ft section (%)	20	30	40	No limit
Maximum total scaling deduction in 16-ft section (%)	50	50	50	No limit

After the tentative grade of the section is established from face examination, the section will be **reduced one grade** whenever the following defects are evident<sup>3</sup>:

**CONKS, PUNK KNOTS AND PINE BORER DAMAGE ON THE SURFACE OF THE SECTION**

- Degrade one grade if present on one face.
- Degrade two grades if present on two faces.
- Degrade three grades if present on three to four faces.

If the final grade of the grading section is 1, 2 or 3, examine the tree for weevil injuries in the merchantable stem **above** 16-ft. If the total apparent weevil damage exceeds 3, degrade the tree grade one below the section grade<sup>3</sup>. Otherwise the tree grade is the same as the final section grade.

<sup>1</sup> Trees under 16-in DBH require four full length good faces.

<sup>2</sup> Scaling diameter is estimated at the top of the 16-ft grading section.

<sup>3</sup> No tree will be designated below Grade 4 unless net tree scale is less than one-third of gross tree scale.

<b>White Pine Collar Diameter Limits for Red &amp; Black Knots</b>			
<b>Scaling Diameter (DIB in)</b>	<b>Black Knots 1/12</b>	<b>Black &amp; Red Knots 1/6</b>	<b>Red Knots 1/3</b>
7	7/12"	1-1/6"	2-1/3"
8	2/3"	1-1/3"	2-2/3"
9	3/4"	1-1/2"	3"
10	5/6"	1-2/3"	3-1/3"
11	11/12"	1-5/6"	3-2/3"
12	1"	2"	4"
13	1-1/12"	2-1/6"	4-1/3"
14	1-1/6"	2-1/3"	4-2/3"
15	1-1/4"	<b>2-1/2" Black Max</b>	<b>5" Max</b>
16	1-1/3"	2-2/3"	<b>5" Max</b>
17	1-5/12"	2-5/6"	<b>5" Max</b>
18	<b>1-1/2" Max</b>	<b>3" Red Max</b>	<b>5" Max</b>

**EASTERN WHITE PINE TREE GRADE 5**

Record TREE GRADE 5 for eastern white pine trees that do not have a 12-foot log in the butt 16-foot grading section due primarily to poor form, but do have either an upper 12-foot log or 2 non-contiguous 8-foot logs, and the total board foot cull deduction is less than 67%.

**SPRUCE, FIR, CEDAR (excluding eastern redcedar) TAMARACK AND HEMLOCK**

<b>SPRUCE, FIR, CEDAR, TAMARACK AND HEMLOCK</b>				
<b>Minimum Merchantability Specifications for Grade 1</b>				
<b>DIB (small end of log)</b>	<b>Length (2-ft multiples w/o trim)</b>	<b>Total Deduction</b>	<b>Sweep Permitted</b>	<b>Other Requirements*</b>
6" - 12"	12' - 16'	50%	25%	Not more than one sound knot or branch greater than 2" in diameter.
13" +	12' - 16'	50%	25%	Not more than one sound knot or branch greater than 3" in diameter.

If the tree does not meet the specifications for a grade 1, but does have a 12-foot log in the butt 16-foot section, then record TREE GRADE = 4.

If the tree does not meet the specifications for a grade 1, but does have a 12-foot log in the butt 16-foot section, then record TREE GRADE = 4.

**SPRUCE, FIR, CEDAR (not eastern red) TAMARACK AND HEMLOCK TREE GRADE 5**

Record TREE GRADE 5 for trees that do not have a 12-foot log in the butt 16-foot grading section due primarily to poor form, but do have either an upper 12-foot log or 2 non-contiguous 8-foot logs, and the total board foot cull deduction is less than 67%.



