FOREST INVENTORY AND ANALYSIS
NATIONAL CORE FIELD GUIDE

VOLUME I: FIELD DATA COLLECTION PROCEDURES FOR PHASE 2 PLOTS

Version 4.01

SRS MIDAS VERSION
VALID FOR ALL STATES AND CARIBBEAN
UPDATED MARCH 2012

BASED ON
FOREST INVENTORY AND ANALYSIS
NATIONAL CORE FIELD GUIDE
VERSION 4.0

OCTOBER 2007

This field guide is subject to revision.
Responsibility of keeping this field guide updated resides with the user.

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 PL0T-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 RESAON. 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

Old Code	New Code	Forest Type
382		Delete Australian pine and aggregate with 995 exotic 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.**

10/1/2010 UPDATE

- **Added cover variables**
- **Incremented field guide version to 4.01**

03/2012 UPDATE & CLARIFICATIONS FROM USER COMMENTS

- **Added yellow hi-lighted text**
- **CARIB variables merged into this document.**

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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)
4.01	October 2010 (revised to add cover variables)
4.01	March 2012 (added regional variable and procedureal clarifications as requested by the users)

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). Added text for the March 2012 revision is hi-lighted in yellow.

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
+	National Appendices 1 – 8
+	Regional Supplements

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> [PDR Prompt]

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). Some CORE variable tolerances have been tightened to comply with regional requirements.

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 (outer ring around the subplot):
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 ¼ 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.

Macroplots are not installed in the South and all text regarding macroplots in Section 1.0 to 7.0 has been removed or text changed to light gray for this regional guide.

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.

Annular plots are not installed in the South and all text regarding annular plots in Section 1.0 to 7.0 has been removed or text changed to light gray for this regional guide.

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.

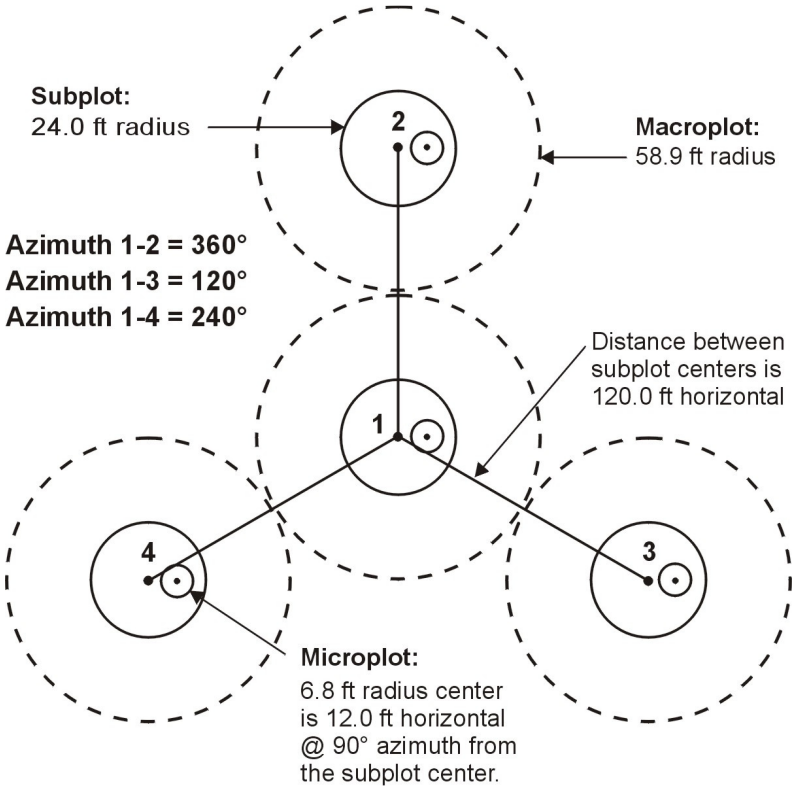


Figure 1. FIA Phase 2 plot diagram. See individual Phase 3 chapters for Phase 3 plot figures.

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. If the previous subplot center pin(s) is found, a new "horseshoe" shape pin is placed over the existing pin location. Bend the microplot center pin in a "pigtail" shape. These pins should be bent so that both wire ends can be pushed into the ground. If the previous microplot pin is found, inspect the condition of previous pin. If the previous microplot pin requires replacement, remove the previous pin and place a new "pigtail" shaped pin. Note: The use of multiple markers at the microplot can degrade the accuracy of the horizontal distance measurements to individual trees. If the previous pin cannot be found, triangulate from previous tallied trees or witness/reference trees to accurately reestablish the subplot or microplot center to the original location. 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 Numbers		Azimuth	Backsight	Distance
From	To	*degrees*		*feet*
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 on the past data printout. If the microplot status is listed as "NEW" or "CENTER", the offset microplot was not installed in the previous inventory and the cruiser installs a new microplot. All saplings on the new offset microplot are assigned RECONCILE code 3 (missed live). If the status is listed as "REMEASURE" or "OFFSET", 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. Every effort is made to provide all of the county materials. However, the crew still has the responsibility prior to ownership collection, to review the county materials for missing current and/or past imagery, past draw sheets or non-forest aids, and past data sheets required to collect ownership and locate the field plot. If materials are missing, the crew should contact the appropriate Knoxville or Starkville personnel to have these materials provided prior to ownership and/or field data collection.

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.

OWNERSHIP DATA ENTRY
The ownership data entry function of the Mobile Integrated Data Acquisition System (MIDAS) 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 MIDAS and transmitted with the plot information. The plot will not pass the final edit unless the ownership data entry function is completed.

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 information in the data recorder.

0.3.1 OWNER YEAR **[OwnYr]**
Record the year in which the ownership information was originally collected.

0.3.2 OWNER MONTH **[OwnMn]**
Record the month in which the ownership information was originally collected.

0.3.3 CONDITION LIST **[CList]**
Record each CONDITION CLASS NUMBER to which this ownership record should be applied.

0.3.4 OWNER CLASS **[OwnCl]**
Record the OWNER CLASS of the current owner. Use the same value assigned in the condition record.

0.3.5 FIRST NAME **[First]**
When OWNER CLASS = 45, record the FIRST NAME of the last person listed as the ownership of record.

0.3.6 LAST NAME **[Last]**
When OWNER CLASS = 45, record the LAST NAME of the last person listed as the ownership of record, including any additional suffixes.

0.3.7 COMPANY **[Comp]**
When OWNER CLASS is NOT 45, record the the company, government, government agency, or other organization that is the ownership of record (i.e., is recorded in the tax office). 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.

0.3.8 ADDRESS 1, 2, 3 **[Add1, Add2, Add3]**
Record the ADDRESS as listed in the tax record.

0.3.9 COUNTRY **[Cntry]**
Record the COUNTRY in which the owner resides.

0.3.10 CITY **[City]**
Record the CITY in which the owner resides.

0.3.11 STATE **[State]**
When COUNTRY = US or MX, record the STATE in which the owner resides.

0.3.12 PROVINCE **[Prov]**
When COUNTRY = CN, record the PROVINCE in which the owner resides.

0.3.13 ZIP CODE **[Zip]**
Record the ZIP CODE corresponding to the owner's address.

0.3.14 PHONE NUMBER 1, 2 **[Ph1, Ph2]**
When available, record the owner's PHONE NUMBER.

0.3.15 PRIVATE OWNER INDUSTRIAL STATUS
Record the PRIVATE OWNER INDUSTRIAL STATUS. Use the same value as recorded in the condition-level variable.

0.3.16 MAP DESCRIPTION **[Desc]**
Record the map description for the ownership record. There are two primary methods used to document survey boundaries – metes and bounds or the Public Land Survey System (PLSS). The map description should be recorded in one of two formats depending on the survey method:

Metes and bounds:
Mx Px (Where M = Map, P = Parcel and x = recorded value)

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

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.

0.3.17 OWNERSHIP SOURCE **[Srce]**
Record the method by which the ownership information was determined (ie. courthouse, neighbor, online GIS, etc.)

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, landclearings and non-forest plots whenever a non-forest plot has adjacent forestland within 50 feet of any subplot center. A draw sheet for a non forest plot 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.

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 sheet) 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 sheet 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 (i.e., within 50 feet of any subplot center) 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 "X" 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 are required for all forested plots. Nonforest plots do not require a new coordinate. Plot center can be pinpricked or marked, or crews may use the new imagery crosshairs to identify plot center.

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.

All forested plots established for the first time (SK1 or SK2 reversions) must be within 50 feet of the DOQ coordinate. Crews must compare their collected PC GPS coordinate with the PC DOQ coordinate prior to any plot establishment and data collection. If the difference between the coordinates is out of tolerance (i.e., more than 50 feet), the crew must adjust the ground location to be within tolerance. All nonforest plots established for the first time do not require a coordinate to be entered into the PDR. The previous coordinate represented on the DOQ is used unless it is found to be in gross error and then a new coordinate is required.

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 for **all plots** when applicable.

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 or inaccessible
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 (i.e., within 50 feet of any subplot center), 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 which is discernable on the photo. 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. Note: In some cases, a

SP is established after the plot is completed along a road, intersection, or other feature. A good SP should be easily identified on the photo, easily found on the ground and unlikely to be disturbed before the next cycle.

RELOCATING OF SAMPLE KIND 2 PLOTS USING GPS, DRAW SHEET AND PAST DATA

As with SK1 plots, enter the DOQ plot coordinate in the GPS unit. If the old SP is found, collect a new coordinate at SP and project a new waypoint using the course to plot azimuth and horizontal distance. (Note: If the old SP is not found, establish a new SP and draw up the photo to establish a new course to plot to project as a new waypoint.) Using the GPS unit, navigate to the DOQ PC coordinate. If you have a good coordinate, evidence of the old plot should be noticed: witness trees or objects as described in the next section. If upon reaching the coordinate and no evidence of witness trees or pins can be found, check the location of the projected PC coordinate. Place temporary flagging at the DOQ coordinate and projected coordinate location and begin to search the area for evidence of the plot. If there has been cutting, review the past tree data information for all subplots. Since only the witness trees are marked, past data trees will require triangulation to find a subplot. This is done by examining species, azimuths, distances and diameters of standing trees or stumps located on either a subplot and/or microplot. If the plot still cannot be found and the course to plot was less than 500 feet, return to the SP and chain the distance to PC. Flag this location and search again. If no pins are found, but you have been able to locate a subplot(s) using past data trees, do not place any pins until you have examined past data trees that are located at the edge of the subplot and/or microplot. If the pin is not properly placed, these previously tallied trees may now be out of the subplot. After you "stick" the pin and edge trees are still out, then trees beyond 24.0 ft and saplings beyond 6.8 ft were incorrectly tallied by the previous crew (cruiser error).

When there has been a disturbance such as clearcut or thinning where there are no remaining residuals trees from the previous cycle, the crew establishes the plot as near as possible to the old location. Crews must still attempt to use triangulation from stumps to locate the plot before "sticking" a new set of pins for the plot.

If the plot was not disturbed (no change on the ground between cycles) and cannot be found, a second attempt to locate the plot is done by another crew and/or QA personnel. If it's another crew, then a final attempt to locate the plot will be done by QA personnel. If the plot is not found by QA, the plot is considered "lost." A lost plot requires a SRS AUTHORIZATION CODE and new PLOT NUMBER for the replacement plot. The code and new plot number is requested from the Knoxville office. To obtain a code and new plot number, the zone supervisor requests the code with the provided justification (why is the plot lost?) and who should receive the code and new plot number for SK3 plot installation. The new plot number is added to the MIDAS state plot list. To account for the lost plot and the new plot, the following steps are followed upon receiving the code and new plot number:

- PLOT STATUS 3 and PLOT NONSAMPLED REASON 06 are assigned to the lost plot MIDAS file. SRS AUTHORIZATION CODE is required.
- A SK3 plot is established at the DOQ coordinate location with the new PLOT NUMBER.
- The DOQ and other county materials are updated to reflect the new plot number.

Plots that are denied access or hazardous also require a SRS AUTHORIZATION CODE. The crew contacts their state coordinator or field supervisor with justification to request the code. These plots are entered as PLOT STATUS 3 and PLOT NONSAMPLED REASON 02 or 03. Note: Hazardous plots may not be hazardous at all times of the year. For example, if a plot cannot be accessed due to high water, then it should be placed on hold until the water level recedes.

WITNESS TREES

When possible, two witness trees reference the location to subplot 1. 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 on the draw sheet.

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

Note: For a DRC woodland species, record the distance and azimuth to the stem that is tagged and not the geographical center of the 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.

DRAW SHEET REQUIREMENTS

As previously stated, all forested plots, landcleared plots, and nonforest plots that require a "non-forest aid" require a draw sheet. **The information on the draw sheet must be legible.** The elements of the draw sheet are the following:

a. Plot Identification information includes the following variables or MIDAS state configuration items: State, Cycle, Subcycle, Inventory Year, County, Plot#, and Phase.

b. Date of plot is the completion date of the plot.

c. Field Editor initials are required to indicate that the draw sheet has been reviewed for all elements and it is complete and without error. The editor can be the cruiser and/or the assistant.

d. PC and SP coordinate are entered. The SP coordinate is optional. If a new PC coordinate is not taken, the coordinate entered should reflect the coordinate used to locate the plot.

e. Photo Information consists of the reference azimuth and angle of intersection. These are used to correct a DOQ coordinate's location. A DOQ correction is required if the new coordinate differs more than 50 feet from the DOQ coordinate or the ground location does not match the DOQ location. For example, the ground location is clearly forest land, but the DOQ coordinate has the plot location in a nonforest condition.

f. Plot Information describes whether a plot is partial (forest and nonforest conditions present on the plot), landcleared at PC, and/or reverted at PC. It also indicates plots that are accessed by boat, completed from a boat and the distance from boat to landing. This information is used by the next crew for planning.

g. Owner Information includes the name, owner class and telephone number.

h. SP Description and Field Notes describe the starting point (tree or object) and additional notes to locate the starting point. If a tree is used, the species, diameter and other identifiers about the tree are indicated.

i. Course to Plot is entered from SP to PC. However, there are situations where additional course to plot information may be warranted from an alternate SP to PC or from SP to an outer subplot.

j. Witness Trees (or object) information is indicated for the subplot center being witnessed. For most plots this is subplot 1. Subplot 2, 3, or 4 can be witnessed for partial plots and nonforest plots that require a "non-forest aid." Landcleared plots do not require witness information unless it meets the nonforest requirements for a "non-forest aid.

k. SP to PC Sketch must provide enough detail so that the SP or PC can be located on the ground. The sketch must include road names/numbers; nearest town, intersection or landmark; mileages when applicable; a North arrow; and any other features that are determined to be necessary. Neatness and clarity are required.

l. Plot Area Sketch is a general sketch of the plot. It should include any features that will aid the next crew in locating the plot or subplots. These features may be water, fences, divisions of forest type, etc.

m. Crew Information includes name and SRS issued cruiser code.

n. Sketch to Plot is a quick overview of what elements are encountered from SP to PC along the course to plot. These features may include R.O.W., fences, water, etc.

o. Subplot Condition and Boundary Sketch is a rendering of the conditions and boundaries present on each subplot. Since the plot diagram is not to scale, is not critical that boundary lines match between subplots.

p. Notes are written as needed. These notes usually describe unusual situations in regards to the plot or subplots. For example, "Subplot 3 was not established by the previous crew at 120' but at 110'." Or sometimes they reflect safety issues like "Subplot 4's plot center falls on the edge of a cliff and the microplot center is occupied by rattle snakes!"

Draw sheet example for a plot with accessible forest land (front)

STATE	CYCLE	SUBCYCLE	INV. YEAR	COUNTY	PLOT#	PHASE	YEAR	MO	DAY	FIELD EDIT			QA USE		
05	10	1	2011	143	0999	2	2011	08	17	TMB					

GPS COORDINATES							
	LATITUDE			LONGITUDE			
Plot center	36	01	59.38	21	05	00.67	
Starting point	36	02	03.17	21	04	53.49	
PHOTO INFORMATION							
REFERENCE AZIMUTH							
ANGLE OF INTERSECTION							

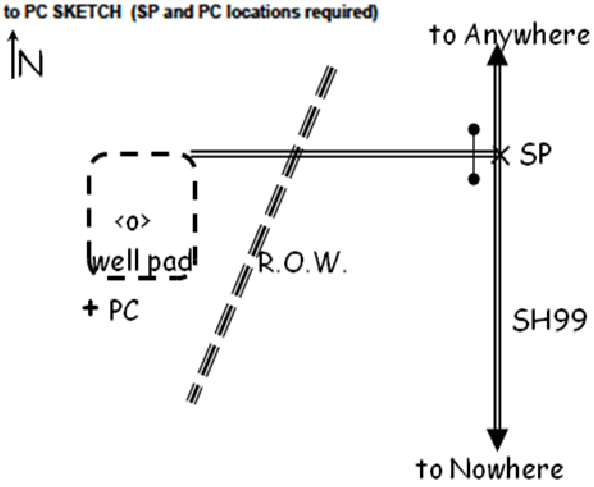
PLOT INFORMATION			
PARTIAL PLOT	X	BOAT ACCESS PLOT	
LANDCLEARED AT PC		PLOT MEASURED BY BOAT	
REVERTED AT PC		DIST. FROM BOAT LANDING	
OWNER INFORMATION			
NAME	C.A. Wood		
OWNER CLASS	45	PHONE	(479) 123-4567

SP DESCRIPTION AND FIELD NOTES
SP is the intersection of well access road and SH 99. Locked gate 20' west of SP.

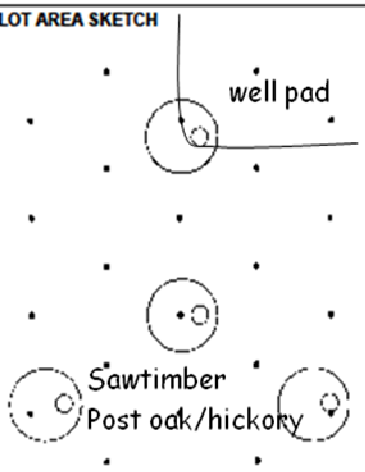
COURSE TO PLOT				
FROM	AZ.	DIST.	CIRCLE SLOPE OR HOR	TO
SP	245	703'	SLP (HOR)	PC
			SLP HOR	
			SLP HOR	
			SLP HOR	
			SLP HOR	

WITNESS TREES		SUBPLOT NUMBER: 1
	WHITE TAG	BASE TAG
SPECIES NAME	Post Oak	Pignut Hickory
DBH	12.2" @ 5.6'	9.0"
AZIMUTH	343	077
HOR. DIST	6.6'	15.2'
NOTES	Fork @ 10'	

SP to PC SKETCH (SP and PC locations required)



PLOT AREA SKETCH

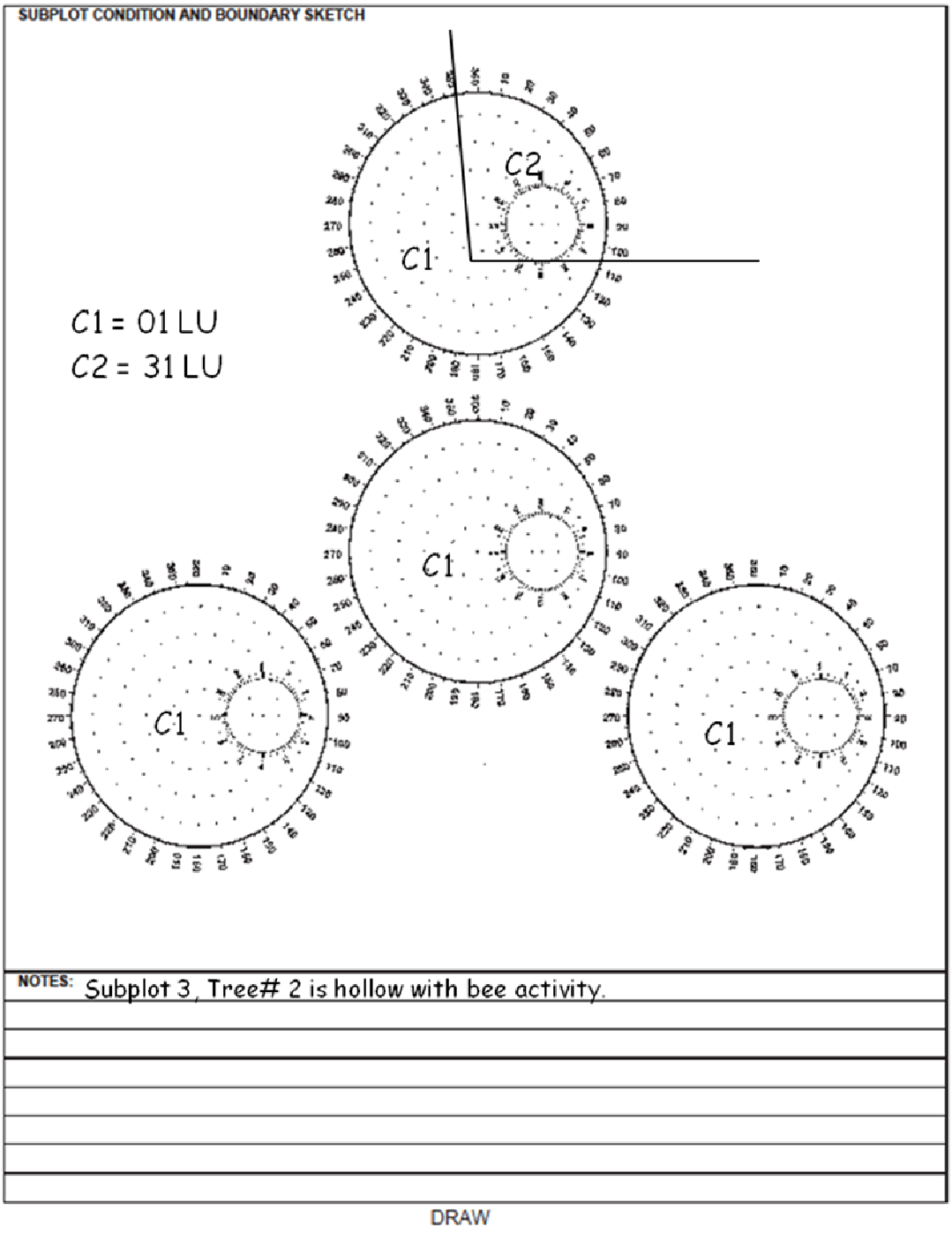


CREW	NAME	CODE
CRUISER	T.H. Best	998
ASSISTANT 1	I.M. Better	999
ASSISTANT 2		

SKETCH TO PLOT

DRAW

Draw sheet example for a plot with accessible forest land (back)



Non forest plots that require a non-forest aid will require a new draw sheet at each cycle visit. This will prevent what is known as “plot drift” for non forest plots that have not been permanently monumented at PC. The non-forest aid prevents plot drift (movement of the non forest location between cycles where no change has occurred on the ground) by witnessing the center location of any subplot. The subplot witness should be identifed on the draw sheet. A subplot pin can be placed unless it’s a hazard for the non forest condition. For example, a pin should not be placed in fields that are tilled or mowed.

Crews establishing plots near a forested edge (where the forest stand age is greater than the time gap between cycles) must verify that the change from PLOT STATUS 2 to 1 is not due to plot drift. If a non-forest aid was not provided, crews must contact Knoxville or Starkville to see if a non-forest aid is present with the previous cycle materials or an older cycle. Older imagery may be requested as well. If the crew suspects cruiser error of the original plot establishment, the crew must contact their supervisor for instruction on how to best establish the plot.

Draw sheet example of a Non-Forest Aid

NON-FOREST AID

STATE	CYCLE	SUBCYCLE	INV. YEAR	COUNTY	PLOT#	PHASE	YEAR	MO	DAY	FIELD EDIT	QA USE
05	10	1	2011	143	0999	2	2011	08	17	MTB	

GPS COORDINATES	LATITUDE			LONGITUDE		
Plot center	36	01	59.38	21	05	00.67
Starting point	36	01	59.16	21	04	57.63

PHOTO INFORMATION	
REFERENCE AZIMUTH	
ANGLE OF INTERSECTION	

PLOT INFORMATION			
PARTIAL PLOT		BOAT ACCESS PLOT	
LANDCLEARED AT PC		PLOT MEASURED BY BOAT	
REVERTED AT PC		DIST. FROM BOAT LANDING	

OWNER INFORMATION			
NAME	C.A. Wood		
OWNER CLASS	---	PHONE	(479) 123-4567

SP DESCRIPTION AND FIELD NOTES

SP is a post oak (22.4" DBH) located at the west edge of gas line R.O.W. where the gas line crosses the southern fence line of pasture. PC is located in the SW corner of fenced pasture. Entire plot falls in pasture. Subplot 4 has been witnessed.

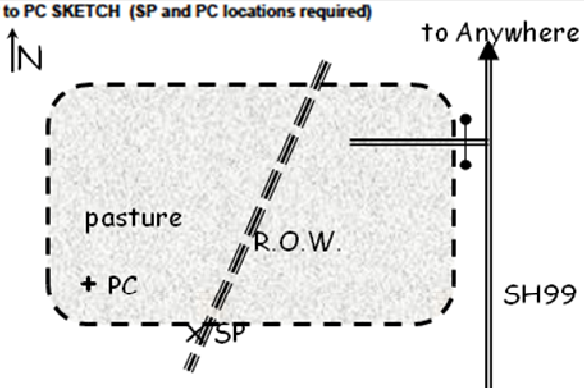
COURSE TO PLOT

FROM	AZ.	DIST.	CIRCLE SLOPE OR HOR	TO
SP	281	250.2'	SLP (HOR)	PC
			SLP HOR	
			SLP HOR	
			SLP HOR	
			SLP HOR	

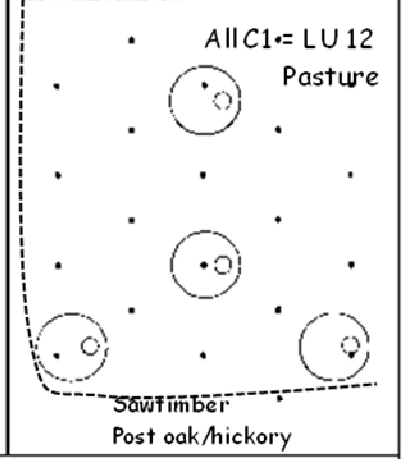
WITNESS TREES SUBPLOT NUMBER: 4

	WHITE TAG	BASE TAG
SPECIES NAME	Post Oak	Pignut Hickory
DBH	12.2" @ 5.6'	9.0"
AZIMUTH	270	180
HOR. DIST	24.5'	30.2'
NOTES	In fence line	In fence line

SP to PC SKETCH (SP and PC locations required)



PLOT AREA SKETCH



CREW	NAME	CODE
CRUISER	T.H. Best	998
ASSISTANT 1	I.M. Better	999
ASSISTANT 2		

SKETCH TO PLOT

SP — PC

DRAW

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, careful field edits of the drawpage and imagery are a vital part of data collection. All plot data are to be collected using the MIDAS program. This program indicates warnings and errors. All warnings must be reviewed prior to leaving the plot area and corrections applied if warranted. A plot is incomplete if errors are present. The field crew must resolve all errors before leaving the plot area. If the crew believes a warning and/or error is not valid, the MIDAS programmer is contacted.

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. Note: County materials should be reviewed prior to ownership collection.

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 **[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 **[CNTY]**

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 **[PLOT]**

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 (paper tally only – not valid for MIDAS)

1.4 PLOT STATUS **[PltSt]**

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 **[PNSR]**

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. [Office variable not collected in the field.]

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 **[SK]**
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 and is provided to field crews along with the authorization code for the plot that is being replaced (the lost plot).

1.8 PREVIOUS PLOT NUMBER **[PrPl#]**
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. This is a configuration variable and is used to select plots in MIDAS.

When collected: All plots
Field width: 2 digits (x.y)
Tolerance: No errors
MQO: At least 99% of the time
Values: 4.01 (paper tally only)

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 **[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: ≥ 2003

1.10.2 MONTH **[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 **[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)
This variable is not applicable in the South.

1.12 HORIZONTAL DISTANCE TO IMPROVED ROAD **[DRoad]**
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. Improved roads should not have advanced rutting, old washouts, old fallen trees, vegetation, etc. that inhibits regular vehicular travel.

Note: Public roads maintained by federal, state, county or municipalities are improved roads; however, these roads may or may not be passable at all times of the year. Maintenance on public road systems is periodic due to funding and the degree of maintenance varies by the public authority. Road systems maintained by public agencies (e.g., NFS, state forests, etc.) may be considered

improved if they meet the qualifications. Maintenance on these roads is periodic as well due to funding.

A private drive or access road within accessible forest land is considered a road if it meets the qualifications stated above.

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 **[Water]**

Record the water source that has the greatest impact on the area within the accessible forest land portion of any of the four subplots. Water occurring between subplots or part of a nonforest condition is not recorded, but should be identified on the plot area sketch on the DRAW page. 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 forested swamps, bogs or marshes classified as accessible forest land 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 (e.g., ephemeral and intermittent) can be seasonal, but may also have water present after a weather event.
5	Flood zones – evidence of flooding when bodies of water exceed their natural banks
9	Other temporary water – specify in plot notes

Note: Permanent streams and water may or may not have water present during periods of extreme drought. Crews should do their best to code this variable as it would be found during normal precipitation year. Topographic maps can be consulted to assist in this assessment.

1.14 QA STATUS **[QASt]**

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 – paper tally only)
4 Training/practice plot (off grid – SRS field crew certification plot – paper tally only)
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 **[Crew1, Crew2, Crew3, Crew4]**

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 that is not capable of correcting the coordinate to plot center, 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 that is not capable of correcting the coordinate to plot center, 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.

Note: The PLGR is no longer utilized in the South. Plot center coordinates are collected using the Emtac GPS receiver and Landmark software on the PDR. If either the Emtac or Landmark is not functioning, the default GPS receiver is the Garmin 60, Garmin 76 or a comparable GPS unit. Crews must contact the Knoxville office when the Emtac or Landmark is not functioning for either replacement or assistance.

1.16.3 GPS UNIT **[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, Emtac/Landmark)
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 **[GPS#]**

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 (cccnn)
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 **[LatDg]**
Record the latitude degrees of the plot center as determined by GPS.

When collected: All plots
Field width: 3 digits (1st 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 **[LatMn]**
Record the latitude minutes of the plot center as determined by GPS.

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

1.16.7.3 LATITUDE SECONDS **[LatSe]**
Record the latitude decimal seconds of the plot center to the nearest hundredth place as determined by GPS.

When collected: All plots
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 **[LonDg]**

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

When collected: All plots
Field width: 4 digits (1st 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 **[LonMn]**

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

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

1.16.8.3 LONGITUDE SECONDS **[LonSe]**

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

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

1.16.9 UTM ZONE

This variable is not applicable in the South.

1.16.10 EASTING (X) UTM

This variable is not applicable in the South.

1.16.11 NORTHING (Y) UTM

This variable is not applicable in the South.

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 or other units that do not allow for corrections back to PC, then record items 1.16.13 and 1.16.14. Both the Garmin units and Landmark software allow coordinates to be corrected back.

Note: These two variables should not be used unless coordinates cannot be taken at subplot 1 and the GPS unit does not have a feature that allows the correction of coordinates back to PC. If the values entered are other than 000, these values are used to adjust the entered latitude and longitude coordinates during data processing.

1.16.13 AZIMUTH TO PLOT CENTER **[Azi]**

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 **[Dist]**

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 **[Elev]**

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.

When collected: When GPS UNIT = 1, 2 or 4
Field width: 6 digits (1st 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 **[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 **[#Read]**

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)

This variable is not applicable in the South.

1.17 MACROPLOT BREAKPOINT DIAMETER (CORE OPTIONAL)

This variable is not applicable in the South.

1.18 PLOT NOTES **[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 **[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 **[SUBCY]**

Record the subcycle of the plot.

When collected: All plots
Field width: 2 digits
Tolerance: No errors
MQO: At least 99% of the time
Values: 1 to 10

1.21 SRS PHASE

Record the phase number of the plot. This is a configuration variable and is used to select plots in MIDAS.

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? **[CCOR?]**

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 **[NewCo]**

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 **[PYear]**

Record the year that the plot was last inventoried.

When collected: SAMPLE KIND = 2
Field width: 4 digits
Tolerance: No errors
MQO: At least 99% of the time
Values: varies with state or territory

1.24.2 SRS PAST MONTH **[PMon]**

Record the month that the plot was last inventoried.

When collected: SAMPLE KIND = 2
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 **[PDay]**

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

When collected: SAMPLE KIND = 2
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 (paper tally only)

1.26 SRS PLOT ACCESSIBILITY **[PltAc]**

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 **[GPSSt]**

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	Current GPS coordinates collected normally (includes instances when coordinates cannot be collected)
2	Current GPS coordinates range calculated
9	Plot remotely sampled – no field visit

1.28 SRS AUTHORIZATION CODE **[Auth#]**

An authorization code is required for all nonsampled plots in the South. To obtain the code, contact your state coordinator or supervisor. Record the appropriate code in the data recorder.

A lost plot requires a SRS AUTHORIZATION CODE and new PLOT NUMBER for the replacement plot. The code and new plot number is requested from the Knoxville office. To obtain a code and new plot number, the zone supervisor requests the code with the provided justification (why is the plot lost?) and who should receive the code and new plot number for SK3 plot installation. The new plot number is added to the MIDAS state plot list. To account for the lost plot and the new plot, the following steps are followed upon receiving the code and new plot number:

- PLOT STATUS 3 and PLOT NONSAMPLED REASON 06 are assigned to the lost plot MIDAS file. SRS AUTHORIZATION CODE is required.
- A SK3 plot is established at the DOQ coordinate location with the new PLOT NUMBER.
- The DOQ and other county materials are updated to reflect the new plot number.

Plots that are denied access or hazardous also require a SRS AUTHORIZATION CODE. The crew contacts their state coordinator or field supervisor with justification to request the code. These plots are entered as PLOT STATUS 3 and PLOT NONSAMPLED REASON 02 or 03. Note: Hazardous plots may not be hazardous at all times of the year. For example, if a plot cannot be accessed due to high water, then it should be placed on hold until the water level recedes.

When collected: When PLOT STATUS = 3
Field width: 5 digits
Tolerance: No errors
MQO: At least 99% of the time
Values: 00001 - 9999

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. If PLOT STATUS = 1, you must delineate between the 5 conditions listed. For example, if subplot 1 and 2 is forest, subplot 3 is census water and subplot 2 is nonforest pasture. These 3 conditions are recorded. However, on each individual subplot, 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). See 4.0 Boundary for illustrations delineating subplots by condition class status.

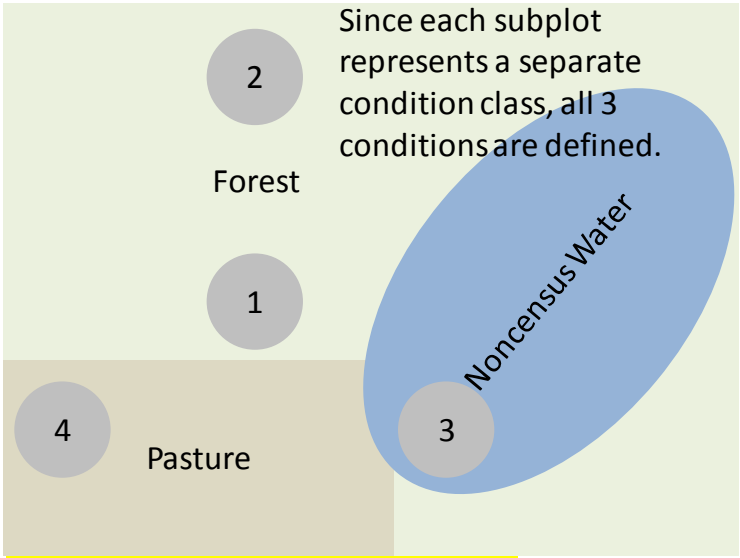


Figure 1a. All conditions are delineated.

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 2.4).

SRS Note: Do not consider evidence of "possible" or future development or conversion when determining accessible forest land. A forest land condition will remain in the sample as forest at the time of the field visit and will be examined during the next cycle to see if it has become nonforest land.

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).

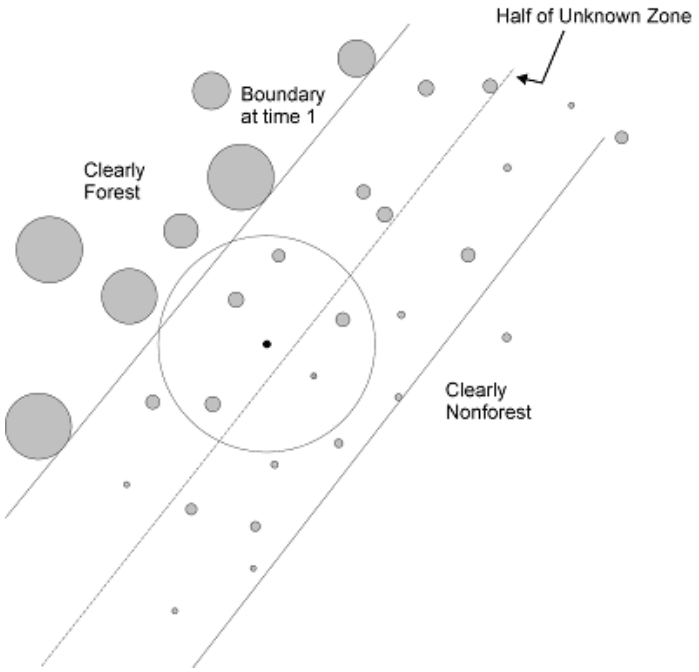


Figure 2. Example of classifying the condition class of the subplot in a transition zone with forest/nonforest encroachment.

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.

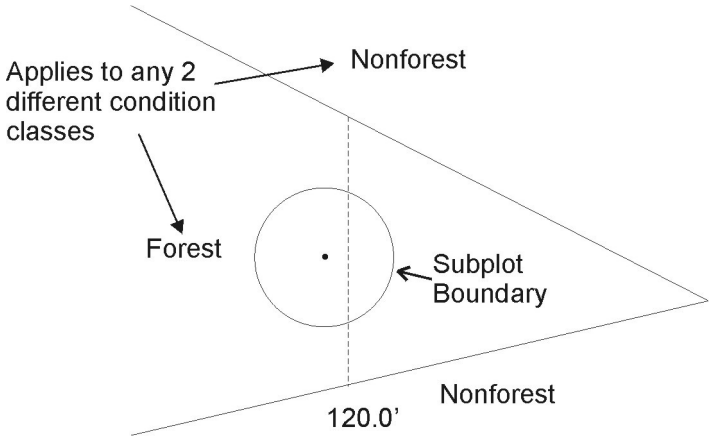


Figure 3. Forest condition narrows within a nonforest land condition. Examine the location of the subplot center in reference to the approximate line where the forest narrows to 120.0 ft wide. In this example, the entire subplot is classified as forest.

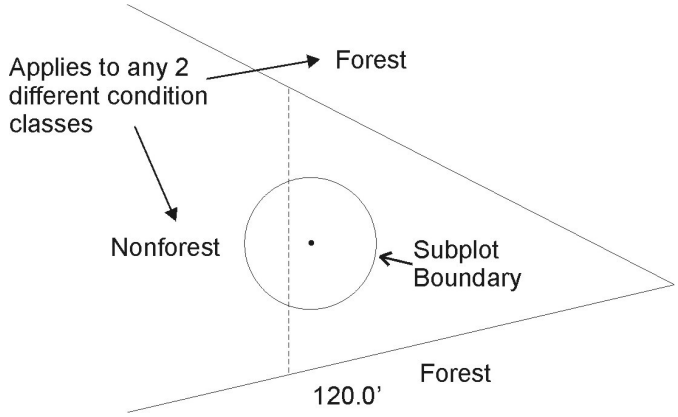


Figure 4. Nonforest land condition narrows within a forest condition. Examine the location of the subplot center in reference to the approximate line where the nonforest narrows to 120.0 ft wide. In this example, the entire subplot is classified as forest.

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). If a subplot center is classified as census water, the entire subplot is classified as this condition.

5. Nonsampled
See section 2.4.3 CONDITION NONSAMPLED REASON for descriptions of land that qualifies as nonsampled. If a subplot center is classified as hazardous, the entire subplot is classified as this condition.

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:

2.5.1 RESERVED STATUS
2.5.2 OWNER GROUP
2.5.3 FOREST TYPE
2.5.4 STAND SIZE CLASS
2.5.5 REGENERATION STATUS
2.5.6 TREE DENSITY

} Attributes where a change causes a separate condition class

2.5.7 OWNER CLASS
2.5.8 PRIVATE OWNER INDUSTRIAL STATUS
2.5.9 ARTIFICIAL REGENERATION SPECIES
2.5.10 STAND AGE
2.5.11 DISTURBANCE (up to 3 coded)
2.5.12 DISTURBANCE YEAR (1 per disturbance)
2.5.17 TREATMENT (up to 3 coded)
2.5.18 TREATMENT YEAR (1 per treatment)
2.5.23 PHYSIOGRAPHIC CLASS

} 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).

2.5.25 SRS PRESENT LAND USE
2.5.26 SRS TRACT TOTAL ACRES
2.5.27 SRS TRACT PERCENT FOREST
2.5.28 SRS STAND STRUCTURE
2.5.29 SRS OPERABILITY
2.5.30 SRS CONDITION SITE CLASS
2.5.31 SRS FIRE
2.5.32 SRS GRAZING
2.5.33 SRS CUTTING TYPE 1, 2, 3

} SRS Regional Items

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 entire condition. For practicality, this is the visual acre.

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, levees, 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. As shown in Figure 5, improved roads, R.O.W. and noncensus water that are less than 120 feet in width do not necessarily break up a forest condition that is between switchbacks. The switchback rule allows narrow strips such as roads and noncensus water between switchbacks to be classified as forest land. However, the portion of the strip that narrows to less than 30 feet is considered an inclusion of the nonforest land use. The area is disqualified as forest land due to the regional rule that forest land must be at least 30 feet in width. In Figure 6a, 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. 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.

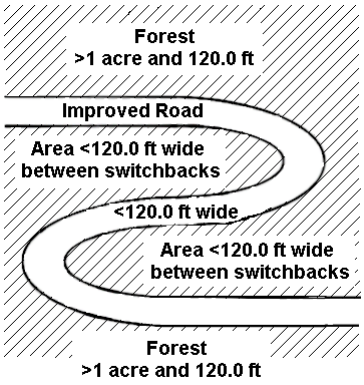


Figure 5. Example of a switchback road.

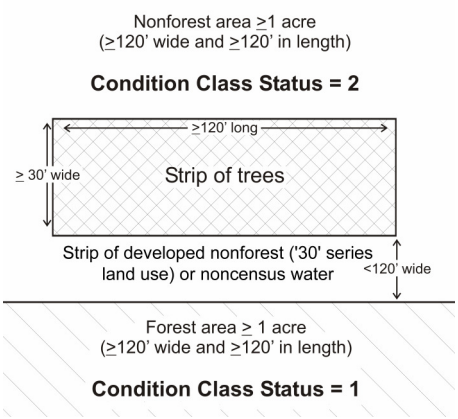


Figure 6a. Example of forest condition crossing a nonforest strip.

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. See Figure 6b.

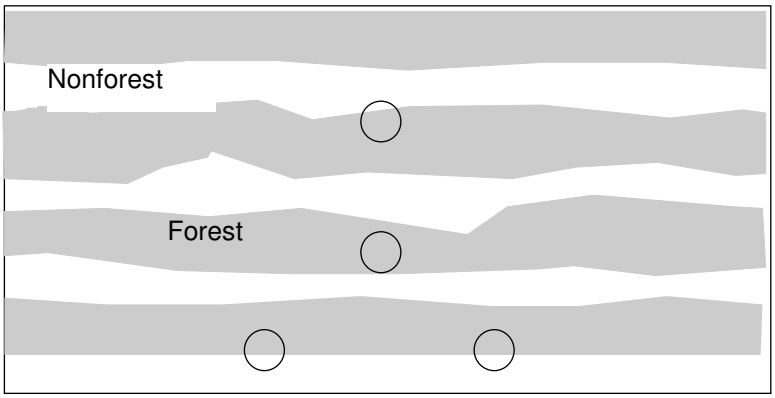


Figure 6b. Entire plot area consists of strips of forest and nonforest land. None of the strips meets the 120 ft minimum width to qualify as a separate land use and the nonforest strips are not developed nonforest conditions. In this example, the entire area is classified as forest since the sum of the areas occupied by the forest land use exceeds the sum of the nonforested area in this example.

    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.

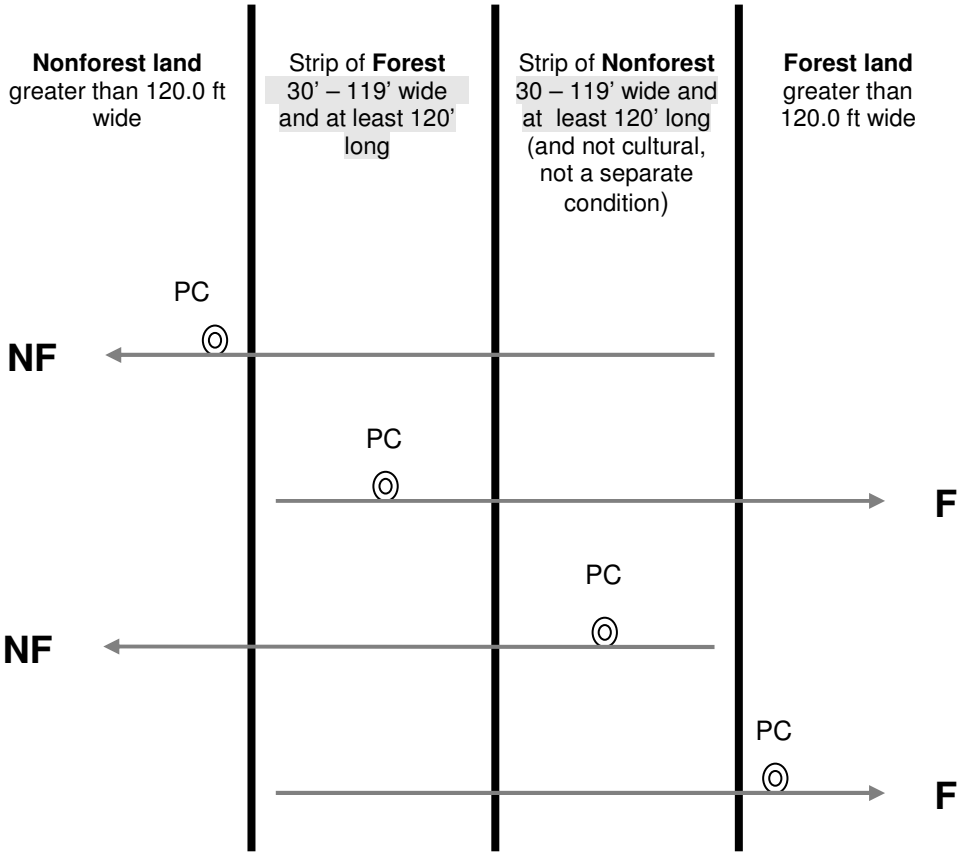


Figure 7. Example of alternating strips of forested and nonforested conditions. PC is the plot center (center of subplot 1.)

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

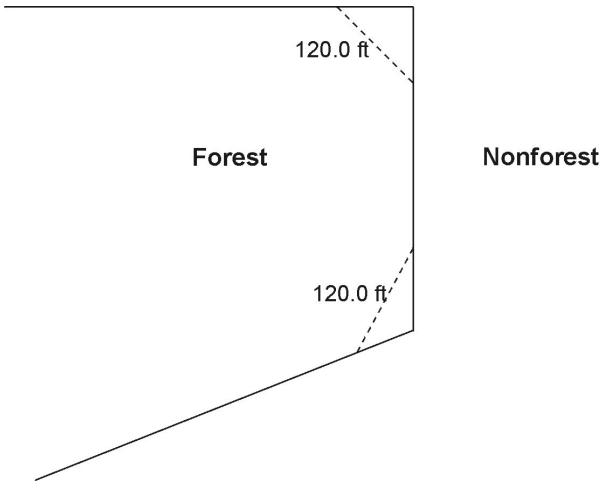


Figure 8. Illustration of the 90 degree corner rule. The dotted lines do not create nonforest land conditions.

4. 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.

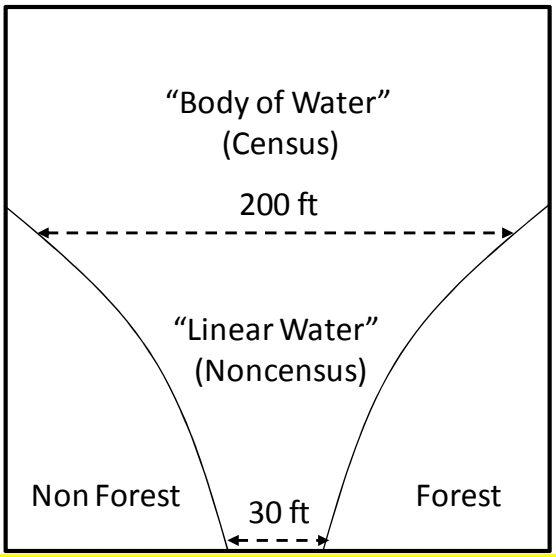


Figure 8a. Linear noncensus water often feeds into census bodies of water.

5. Nonsampled conditions within accessible forest land are delineated, regardless of size, as a separate condition.

2.4.1 CONDITION CLASS NUMBER **[Cond#]**

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 **[CndSt]**

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 **[CNSR]**
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: 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.

   Note: The most common indistinct boundary is the gradual change between natural occurring forest types where there is no abrupt change in physiographic class and where species present may be common to multiple forest types. For example shortleaf pine/oak forest type has the same associates and similar site conditions as shortleaf pine. The difference between the two is the percentage of pine present in the stand. A new condition should only be delineated if there is a notable distinct change in the percentage of pine present.

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. In these figures, forest type "A" qualifies as its own condition (≥120.0 feet and ≥ 1 acre). The riparian area represented by forest type "B" qualifies as its own condition if the area is between 30.0 and 120.0 feet and is ≥ 1 acre.

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.

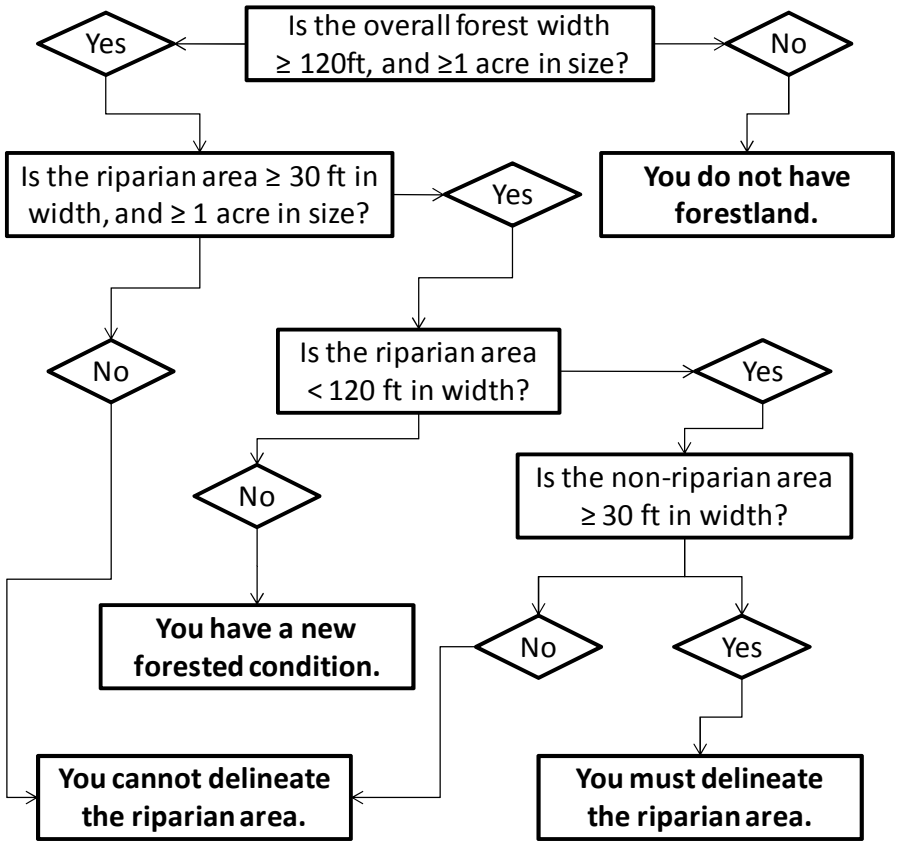


Figure 8a. Riparian Delineation Flowchart

SRS Note: The body of water illustrated in Figure 9 may also be a delineated forested "wetland" condition like cypress domes, cypress ponds, forested swamps/bogs or a forested beaver pond. The edge of these wetlands (forest type B) may qualify as riparian if it meets the width and acreage criteria.

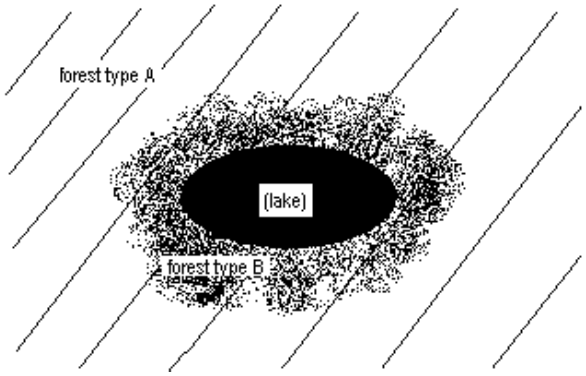


Figure 9. Forest type B is a separate condition class (riparian) if the band is between 30.0 feet and 120.0 feet wide, and is ≥ 1.0 acre in size.

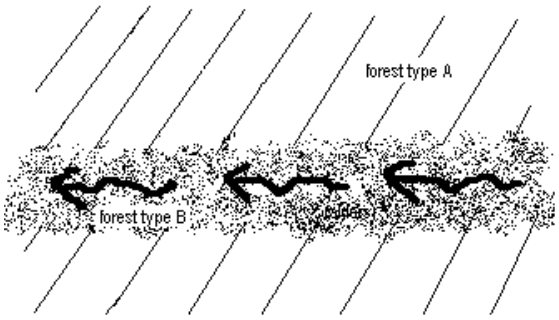


Figure 10. Forest type B is a separate condition class (riparian) if the band including the narrow drainage is between 30.0 feet and 120.0 feet wide, and is ≥ 1.0 acre in size.

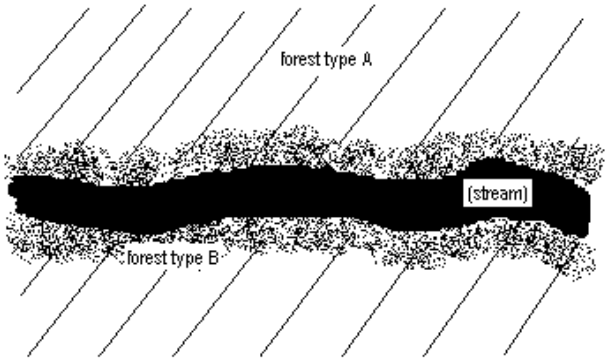


Figure 11. If the stream is < 30.0 feet wide, forest type B is a separate condition class (riparian) if the sum of the two widths of the bands, including the stream falls between 30.0 feet and 120.0 feet wide, and is ≥ 1.0 acre in size.

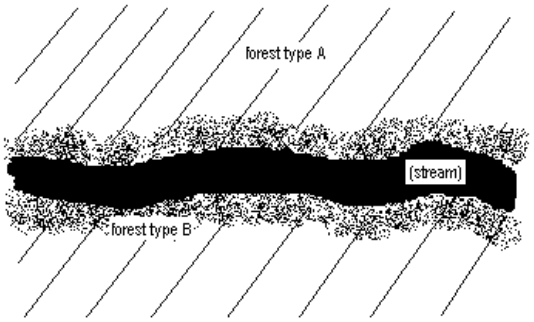


Figure 12. If the stream is > 30.0 feet wide, forest type B is a separate condition class (riparian) if either of the two widths of the bands falls between 30.0 feet and 120.0 feet wide and is ≥ 1.0 acre in size.

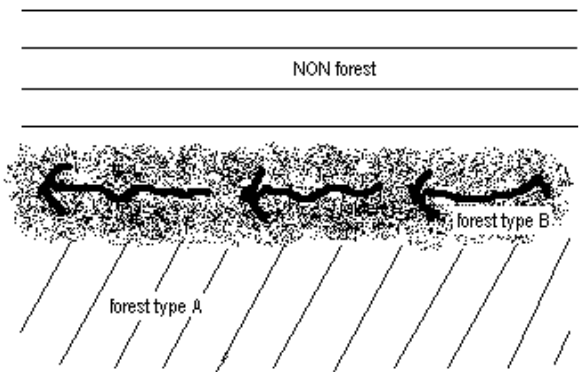


Figure 13. Forest type B is a separate condition class (riparian) if the band of it is between 30.0 feet and 120.0 feet wide, and is ≥ 1.0 acre in size.

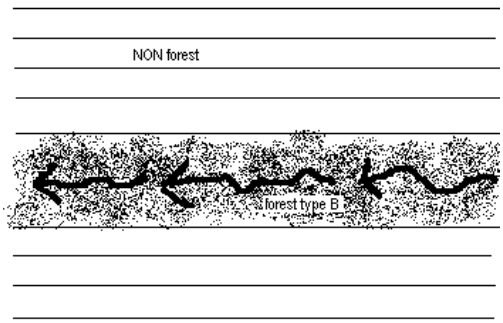


Figure 14. In a nonforested area, a band of forest type B that is < 120.0 feet wide is NOT considered a riparian area. It is not a separate condition class at all.

2.5.1 RESERVED STATUS **[Resrv]**

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 **[OwnGr]**

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 **[FTyp]**

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.

From Appendix 2: 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.

SRS Note: Matching a condition to a nationally defined forest type is often times difficult. Regional forest types cannot be developed without national input (i.e., change proposal procedures). Therefore when determining forest type, first try to match the trees present with the “named” type. If this does not match the stand, match the stand with the trees listed as associates under each type even if the

named type species are not present in the stand. The site or physiographic class should also be considered in determining forest type. When the species tallied do not represent the forest type (e.g., a microsite that does not qualify as a separate condition), a plot note should be written to indicate the disparity between the recorded forest type and the tally.

Caribbean: See variable 2.5.35 SRS CARIBBEAN FOREST TYPE.

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 **[StSz]**
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 ≤ 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 ≥ 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 total 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.

SRS has stocking standards that are found in Appendix 5 for southern timberlands and western woodlands. Currently the stocking standards for the western woodlands apply a 5% cover or 40 seedlings or saplings to meet 10% stocking. Requirements to meet 10% stocking for the southern timberlands will depend on the size and number of trees present on the condition.

2.5.5 REGENERATION STATUS **[RgSt]**

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 **[Dens]**

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 **[OwnCl]**

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 **[IndSt]**

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 **[RgSpp]**

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 **[StAge]**

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~~ add 7 years for longleaf pine, 3 years for other softwoods, and 2 years for all hardwoods. 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:

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

When determining stand age for multi-storied stands, only the live trees that are not overtopped within the STAND SIZE coded are used to determine the weighted average stand age.

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 **[Dist1]**

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 remeasured 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 (includes seedlings and saplings) 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)

Code	Definition
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. (e.g., pine straw removal by raking and baling)
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 **[DYr1]**

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 **[Dist2]**
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 **[DYr2]**
Record the year in which DISTURBANCE 2 occurred. See DISTURBANCE YEAR 1 for coding instructions.

2.5.15 DISTURBANCE 3 **[Dist3]**
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 **[DYr3]**
Record the year in which DISTURBANCE 3 occurred. See DISTURBANCE YEAR 1 for coding instructions.

2.5.17 TREATMENT 1 **[Trmt1]**
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. Note: Natural regeneration is considered a treatment if the stand meets the critieria below. 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 remeasured 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:

Code	Definition
00	None - No observable treatment.
10	Cutting - The removal of one or more trees from a stand.
20	Site preparation - Clearing, slash burning, chopping, disking, bedding, or other practices clearly intended to prepare a site for either natural or artificial regeneration.
30	Artificial regeneration - 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	Natural regeneration - 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	Other silvicultural treatment - The use of fertilizers, herbicides, girdling, pruning, invasive species removal, 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. Note: Prescribed fires are considered a disturbance and not a treatment. See Disturbance 30.

2.5.18 TREATMENT YEAR 1 [TYr1]
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 **[Trmt2]**
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 **[TYr2]**
Record the year in which TREATMENT 2 occurred. See TREATMENT YEAR 1 for coding instructions.

2.5.21 TREATMENT 3 **[Trmt3]**
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 **[TYr3]**
Record the year in which TREATMENT 3 occurred. See TREATMENT YEAR 1 for coding instructions.

2.5.23 PHYSIOGRAPHIC CLASS **[Phys]**
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 **[LUse]**

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.

Regional definitions have been developed for the national codes. Use these codes in conjunction with CONDITION CLASS STATUS 2.

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 - Land utilized for agricultural crops including silage and feed grains; and bare farm fields resulting from cultivation or harvest.

12 Pasture (improved through cultural practices) - Land maintained and used for grazing with stocking less than 10 percent in live trees (established saplings or larger trees), except that occasional large trees with the obvious function of providing shade for livestock. Evidence of maintenance, besides the degree of grazing, includes condition of fencing, presence of stock ponds or water tanks. Land also periodically brush hogged indicated by seedlings 3 to 4 feet in height and basal scars present on trees.

13 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, (established seedlings or larger trees) regardless of species. A field that is between crop rotations should not be called idle, however, cropland.

14 Orchard - Land utilized for orchards and nursery stock.

15 Christmas tree plantation - Active Christmas tree plantation must show signs of annual shearing. Record tree species used in the plantation in the PLOT NOTES.

16 Maintained wildlife opening - Land maintained as a permanent opening of primarily herbaceous vegetation within woodland areas to provide food and cover benefits for early successional wildlife species. *[Source: USDA NRCS]*

17 Windbreak/Shelterbelt - Windbreaks or shelterbelts are plantings of single or multiple rows of trees or shrubs that are established for environmental purposes. Windbreaks or shelterbelts are generally established to protect or shelter nearby leeward areas from troublesome winds. Such plantings are used to reduce wind erosion, protect growing plants (crops and forage), manage snow, and improve irrigation efficiency. Windbreaks also protect structures and livestock, provide wildlife habitat, improve aesthetics, and provide tree or shrub products. Also, when used as a living screen, windbreaks control views and lessen noise. *[Source: USDA NRCS, Windbreak /Shelterbelt Conservation Practice Job Sheet 380, April 1997]*

SRS Note: If the dimensions of the windbreak or shelterbelt meet the minimum dimensions of forest land (1.0 acre in size and 120.0 feet wide), then the area is considered accessible forest land (CONDITION CLASS STATUS 1).

20 Rangeland - Land primarily composed of grasses, forbs, or shrubs that does not meet minimum stocking of live tally trees. 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.

Rangeland is a type of uncultivated land that is dominated by native plants, mostly grasses, broadleaf plants like wildflowers, and shrubs. Rangeland is basically all land in the world that is not farmland, dense forest, barren desert, or land covered by solid rock, concrete, or glaciers. Rangeland includes grasslands, shrublands, savannas, and open woodlands. The land cultivated with grasses and legumes for livestock forage is generally called pasture land. Pasture land is similar to rangeland in many respects except that it is cultivated and managed primarily by agricultural principles, whereas rangeland is not cultivated and managed by ecological principles. [*Source: A Short Course on RANGELANDS. Rangeland Ecology & Management, University of Idaho.]*

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. - Cultural includes multiple family housing – More than one family household per structure, for example, condominiums, townhouses, row houses and apartment buildings. Single family housing – One family or person per structure. Industrial/commercial – Supply yards, parking lots, shopping centers, factories, etc.

32 Rights-of-way: improved roads, railway, power lines, maintained canal, maintained levees, airports, pipelines, or gas/oil well pads. The following are not considered a R.O.W.:

- A canal that qualifies as census or noncensus water is coded as CONDITION CLASS STATUS 3 or 4.
- A driveway adjacent or within a residential area is not considered a R.O.W unless it's bounded by accessible forest land.
- A farm lane adjacent or within cropland, pasture, idle farmland and other agriculture is not considered a R.O.W.

A rail trail that is part of the "rail banking" program is classified as a R.O.W. The rail banking program, created by a congressional amendment in 1983 [to the 1968 National Trails System Act], allows the temporary, though often long-term, use of a disused rail corridor as a public trail while maintaining the option of reactivating the corridor for rail use. If a rail trail can be documented as being part of this program, then a rail trail is a R.O.W. If not, it is treated as an inclusion of the adjacent land use.

33 Recreation: parks, skiing, golf courses, campgrounds, playing fields, athletic, sports tracks, etc.

34 Mining - Surface mining, gravel pits, dumps, landfills or reclaimed mining areas that are at least 1 acre and 120.0 feet in width. Note: Reclaimed mining areas are not always nonforest. Some trees such as black locust readily adapt to reclaimed areas. If the stocking requirement is met, the land is considered forest land. The field crew will make the decision of whether the land is productive or unproductive. Reclaimed mine areas should remain in this land use until either stocking is met for accessible forest land or another nonforest land use applies.

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 - Areas subjected to periodic tidal flooding or other areas where water is present for extended periods during the growing season and for longer periods during the non-growing season. Water usually comes from rainfall, snowmelt, a rising water table, groundwater seepage, or incoming tides. Water may be present on the surface of wetlands for varying periods, as in flooded or ponded wetlands, or it may simply keep the underlying soils saturated near the surface with no surface water present. Wetlands include bogs, marshes, salt marshes, swamps, meadows and fens. *[Source: Tiner]*

- Bogs are not always nonforest. Tree species such as black spruce can adapt to bog conditions. If the stocking requirement is met, the land is considered forest land. The decision as to whether the land is productive or unproductive will be made by the field crews.
- Swamps are not always nonforest. Tree species such as cypress and tupelo readily adapt to the swamp conditions. If the stocking requirement is met, the land is considered forest land. The decision of whether the land is productive or unproductive will be made by the field crews.

43 Beach - Sandy or pebbly shore associated with an ocean or lake or sandbars associated with rivers.

45 Nonforest-Chaparral (not applicable in the Southern Region)

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 **[Acres]**

Tract size is recorded when the OWNER GROUP is 40. 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, 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.

This variable is not collected in WTX.

When collected: CONDITION CLASS STATUS = 1 and OWNER GROUP = 40
Field width: 5 digits
Tolerance: No errors
MQO: At least 99% of the time
Values: 00001-99999

2.5.27 SRS TRACT PERCENT FOREST **[%For]**

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

This variable is not collected in WTX.

When collected: CONDITION CLASS STATUS = 1 and OWNER GROUP = 40
Field width: 3 digits
Tolerance: No errors
MQO: At least 99% of the time
Values: 001-100

2.5.28 SRS STAND STRUCTURE **[Struc]**

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.

This variable is not collected in WTX.

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 **[Oper]**

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.

This variable is not collected in WTX.

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 **[Site]**

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. See Appendix 4 for a limited selection of southern site class curves.

When collected: If CONDITION CLASS STATUS = 1
Field width: 1 digit
Tolerance: +/- 1 class
MQO: At least 99% of the time
Values: 1-7

Note: Caribbean values will be determined by the SRS PRESENT LAND USE. If SRS PRESENT LAND USE = 01, then SRS CONDITION SITE CLASS=6. If SRS PRESENT LAND USE=02, then SRS CONDITION SITE CLASS=7.

2.5.31 SRS FIRE **[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.

This variable is not collected in WTX.

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 **[Graz]**

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.

This variable is not collected in WTX.

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 **[Cut1, Cut2, Cut3]**

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

This variable is not collected in WTX.

When collected: When TREATMENT 1, 2 or 3 = 10
Field width: 2 digits
Tolerance: No errors
MQO: At least 99% of the time
Values:

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.

2.5.34 SRS SECONDARY LAND USE **[SecLU]**

Record the code that best describes the secondary land use of the condition if applicable.

When collected: **CARIBBEAN only:** PRESENT LAND USE = 01 or 02
Field width: 2 digits
Values: Use same codes as described in 2.5.25 SRS PRESENT LAND USE

2.5.35 SRS CARIBBEAN FOREST TYPE **[FTyp]**

Record the code corresponding to the SRS CARIBBEAN FOREST TYPE from the list below that best describes the species with the plurality of stocking for all live trees in the condition class that are not overtopped.

When collected: **CARIBBEAN only**: 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 for full descriptions)

151	Tropical pine	985	Moist forest	991	Paulownia
982	Mangrove	986	Wet and rainforest	992	Melaueca
983	Palms	987	Lower montane rainforest	993	Eucalyptus
984	Dry forest	989	Other tropical hardwoods	995	Other exotic hardwoods

2.5.36 SRS CARIBBEAN PHYSIOGRAPHIC CLASS **[CarPh]**

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

When collected: **CARIBBEAN only:** All accessible forest land condition classes (CONDITION CLASS STATUS = 1)
Field width: 3digits
Tolerance: No errors
MQO: At least 80% of the time

Values:
110 Mountainous – ridge
121 Mountainous – valley – coves (Small upland valley without perennial stream)
122 Mountainous – valley – bottomlands (Non-flooded parts of valley floor)
123 Mountainous – valley – floodplains (Flooded parts of valley floor)
131 Mountainous – slope – upper
132 Mountainous – slope – middle
133 Mountainous – slope – lower
210 Coastal plain – ridge
221 Coastal plain – valley - coves
222 Coastal plain – valley – bottomlands
223 Coastal plain – valley – floodplains
231 Coastal plain – slope – upper
232 Coastal plain – slope – middle
233 Coastal plain – slope – lower
310 Karst – ridge
321 Karst – valley – coves
322 Karst – valley – bottomlands
323 Karst – valley – floodplains
331 Karst – slope – upper
332 Karst – slope – middle
333 Karst – slope – lower
410 Wetland – freshwater
420 Wetland – saltwater

Physiographic class is assigned based on a primary, secondary and tertiary classification. For example, a plot that falls on the middle slope in the mountainous region would be given a physiographic class of '132' (1 = Mountainous, 3 = Slope, 2 = Middle). If no tertiary classification is applicable (i.e. ridge or freshwater/saltwater wetlands) then the third digit should be '0'. For example, a freshwater wetland would be classified as '410' (4 = Wetland, 1 = Freshwater, 0 = Not applicable).

CANOPY COVER and STEM variables overview:

CANOPY COVER variables are condition level variables that are collected on all CONDITION CLASS STATUS 1 and 2 conditions. These variables have no influence in determining CONDITION STATUS and are unrelated to stocking. SRS will continue to utilize the stocking procedures described in Appendix 5 to determine if a condition status 1 is present on a plot.

SRS will utilize the following CANOPY COVER SAMPLE METHODS in order to determine both LIVE (LCC) and LIVE PLUS MISSING CANOPY COVER (LMCC). Condition status, the size / shape of the condition, and the percentage of LIVE PLUS MISSING CANOPY COVER present in the condition determine which CANOPY COVER method is used to measure these variables

Conditon status 1 conditions for both LIVE AND LIVE PLUS MISSING CANOPY COVER:

Ocular method - If LIVE PLUS MISSING CANOPY COVER is 0% OR >12%
Acre method - If LIVE PLUS MISSING CANOPY COVER is >0% and <12%
Subplot method - If LIVE PLUS MISSING CANOPY COVER is >0% and <12%
Sub-acre method - If LIVE PLUS MISSING CANOPY COVER is >0% and <12% and the size or shape of the condition prevents the use of the Acre or Subplot method

For both Condition Status 1 and 2, TOTAL STEMS will be determined by the STEMS calculator in the PDR based on the actual stem count tallied on subplots and mircoplots 1-4. The STEMS calculator will provide an option to override this calculation and enter an estimated STEM count based on field observations.

2.5.37 CANOPY COVER SAMPLE METHOD **[CMeth]**

Record the CANOPY COVER SAMPLE METHOD used to determine LIVE CANOPY COVER, LIVE PLUS MISSING CANOPY COVER, and TOTAL STEMS for the condition. If the ocular method is not used, the appropriate plot-based method should be selected according to the condition's dimensions and shape.

Ocular method - The Ocular method is only used in areas that are obviously 0 % LIVE PLUS MISSING CANOPY COVER or obviously greater than 10% LIVE PLUS MISSING CANOPY COVER. In addition to visual inspections of what is on the ground, crews can also use various types of aerial imagery to help determine LIVE CANOPY COVER and LIVE PLUS MISSING CANOPY COVER values using this method. The Ocular method may also be used on condition status 2 plots were access to the nonforest landcover area may be limited or the nonforest condition is a developed non-forest land use. Note that when the Ocular method is used, it is likely to be easier for the observer to ignore subplot boundaries and assess the percentage of tree canopy cover over the condition in question, without regard to the locations of the stems supporting the canopy over the plot. When using the ocular method, make sure that only the condition for which the estimate is being determined is included in the area of evaluation.

Subplot method - The Subplot method is used when the ocular method is not appropriate and in cases where the terrain, vegetation, and dimensions of a condition or the size of the field crew DO NOT allow a safe or practical sample using the acre method.

1. To estimate cover using the subplot method, the crew measures the crowns of all live trees, seedlings, and saplings on each of the four 1/24 acre subplots. To estimate total stems per acre, stems $\geq$5.0 inches diameter are counted on the subplots and stems <5.0 inches diameter are counted only on the four 1/300 acre microplots located 90 degrees and 12.0 feet from the subplot centers. The sample may consist of any combination of regular subplots and/or phantom subplots, provided all subplots fall entirely in the questionable condition.

2. Install phantom subplots as necessary to yield four 1/24-acre sample areas that fall entirely within the questionable condition. Record the location of these phantom or temporary subplots on your four point plot sketch and monument. Establish phantom plots using the following protocol (fig. 15):

a. Begin by locating the phantom subplots using the "highest" numbered regular subplot that falls in the questionable condition (e.g., 4 is the highest numbered regular subplot, next 3 and then 2). The phantom subplots are located in the following fashion: 1) 120.0 feet at 360 degrees, 2) 120.0 feet at 120 degrees, then 3) 120.0 feet at 240 degrees.

b. If this fails to yield 4 subplots that fall entirely within the questionable condition, install the remaining phantom subplots off the next highest numbered regular subplot that falls in the questionable condition.

c. If this fails to produce a suitable location, rotate the phantom subplot off the other phantom subplots in the attempted order of installation until 4 subplots have been located in the questionable condition.

3. The Subplot method uses a 1/6-acre sample, so it would require a total of 726 ft^2 of LIVE PLUS MISSING CANOPY COVER to reach 10% threshold.

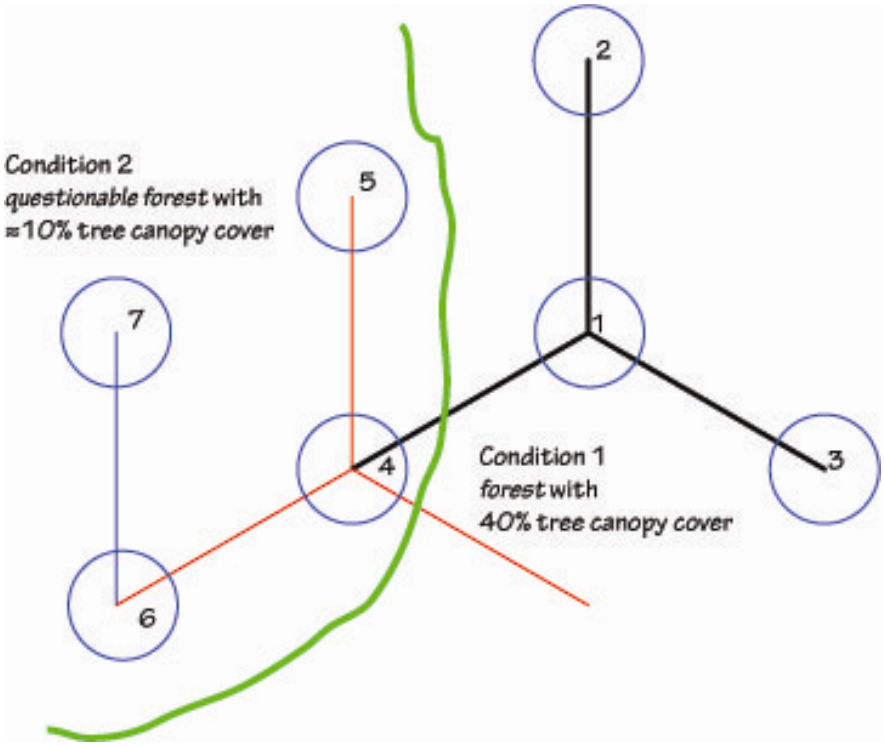


Figure 15. Example of the subplot method phantom subplots.

Acre method - The Acre method is used when the ocular method is not appropriate and when it is safe and practical to sample on the entire acre.

1. To determine the % canopy cover, the crew samples all live, dead, and missing tree canopies on the one-acre sample plot (117.75 foot radius) as described below in LIVE PLUS MISSING CANOPY COVER.
2. If the 10% LIVE PLUS MISSING CANOPY COVER threshold is met and there is additional LIVE PLUS MISSING CANOPY COVER on the acre plot, crews can estimate the remaining LIVE PLUS MISSING CANOPY COVER using the ocular method.
3. If the 10% LIVE PLUS MISSING CANOPY COVER threshold is not met, a sample of all live seedlings, saplings, and trees that are within the acre plot (117.75 foot) radius is required.
4. As with the subplot method, the sample acre (117.75 foot radius plot) must fall entirely in the questionable condition.

Percent Canopy Cover Calculation for Acre method:

If a condition is close to 10% canopy cover, and other methods may not accurately represent tree canopy cover due to irregular spatial distribution of tree canopies (e.g., *clumpiness*), the Acre method provides another estimate of the total tree canopy area within the radius of a 1-acre plot located within the condition in question.

Given:

1. The area of an acre is 43,560 $ft^{2.}$
2. A 1-acre circle has a radius of 117.75 ft.
3. 10% of 1-acre is 4,356 ft^2.

and assuming the canopies to be ellipses:

1. Measure the approximate canopy diameter (long axis and short axis) for each tree on the acre.
2. Calculate the canopy area for each tree as Canopy Area = pi*long axis d/2*short axis d/2).
3. Add up the Canopy Areas, and divide by 435.6 (1% of an acre) to obtain percent cover (truncate)

Transition zones and forest/nonforest encroachment – When an accessible forest land condition encroaches into a nonforest condition, the border between forest and nonforest is often a gradual change in tree cover or stocking with no clear and abrupt boundary. This may cause difficulties determining exactly where the forested area meets the minimum canopy cover or stem count criteria. For these cases, determine where the land clearly meets the minimum requirements, and where it clearly is less than required. 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.

If the Acre plot falls on or very near a transition, the Acre plot should be moved into the condition identified at plot center (fig. 16)

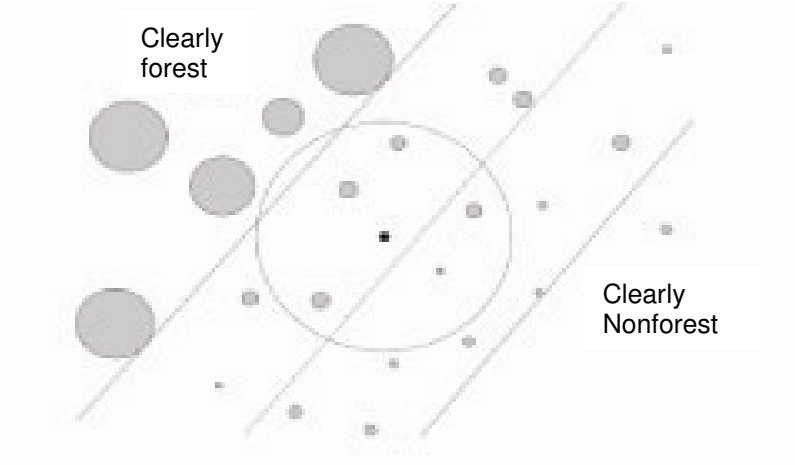


Figure 16. Example of classifying the condition class of the subplot in a transition zone with forest/Nonforest encroachment.

For example, at measurement time 1, a clear and distinct boundary existed between the forest and nonforest 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 meets cover / stem count criteria 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 does not clearly meet cover / stem count criteria where it meets the nonforest, determine where the land clearly meets the minimum requirements, and where it clearly is

less than required. Divide the zone between these points in half and classify the entire subplot based on which side of the line the subplot center falls.

Sub-acre method - The Sub-Acre method is *only* used when the ocular method is not appropriate and *only* when the acre or subplot methods can not be established due to the condition's shape, dimensions or accessibility.

1. Ensure that the canopy cover sample area is representative of the condition in question.
2. Determine if minimum 10% LIVE PLUS MISSING CANOPY COVER is reached. The crew samples all live, dead, and missing tree canopies on the canopy cover sample plot as described above in LIVE PLUS MISSING CANOPY COVER. The 10% threshold is dependent on the sample plot size and respective area in square feet.
3. If the 10% LIVE PLUS MISSING CANOPY COVER threshold is met and there is additional LIVE PLUS MISSING CANOPY COVER on the sub-acre plot, crews can estimate the remaining LIVE PLUS MISSING CANOPY COVER using the ocular method.
4. As with the acre and subplot method, the sub-acre sample plot(s) must fall entirely in the questionable condition.
5. Potential circular plot sizes and appropriate scaling factors:

Acre Fraction	Radius (ft)	Area (sq ft)	10% Cover (sq ft)	Stem Count Multiplied
1	117.7	43,560	4356	x1
1/2	83.3	21,780	2178	x2
1/3	67.6	14,520	1452	x3
1/4	58.9	10,890	1089	x4
1/5	52.7	8,712	872	x5
1/6	49.0	7,260	726	x6

When collected: CONDITION CLASS STATUS = 1 or 2
Field width: 1 digit
Tolerance: None
MQO: At least 90% of the time
Values:

1	Ocular method
2	Subplot method
3	Acre method
4	Sub-acre method

2.5.38 LIVE CANOPY COVER (LCC) **[%Live]**

Record the percentage of LIVE CANOPY COVER for the condition. Include live tally trees, saplings, and seedlings that cover the sample area. For conditions where the LIVE CANOPY COVER is low and there is a question whether it meets 10 percent LIVE CANOPY COVER, the crew will measure every crown width within the canopy cover sample area. When the 10% threshold is determined by measuring crown widths, the crew can use the ocular method to determine the total LIVE CANOPY COVER value.

Canopy widths are measured using the ellipse formula for calculation of canopy area. This requires two measurements. The first measurement is the long axis diameter. The second measurement is made at 90 degrees to the first measurement at the widest point of the crown (fig. 17). Canopy area = pi*((long axis diameter/2)*(90 degrees axis diameter/2)).

LCC and LMCC can be calculated on the PDR. If calculating by hand use pi = 3.14 in the above formula. Round all axis diameters to the nearest foot. Enter all seedlings whose crowns are less than 1' by 1' as 1'by 1'.

- Do not include the crown portion of trees, saplings, or seedlings that are vertically overtopped by other trees, saplings or seedlings.

- Only include tree canopy measurements from trees with stems that originate within the sample area, although canopy measurements can extend outside the sample area.
- Occasionally, a branch may protrude abnormally, but the lateral crown line is drawn across the portion of the branch which includes the "normal outline" of the tree.
- For leaning trees, ocularly upright the trees and measure crowns as if the trees were upright.

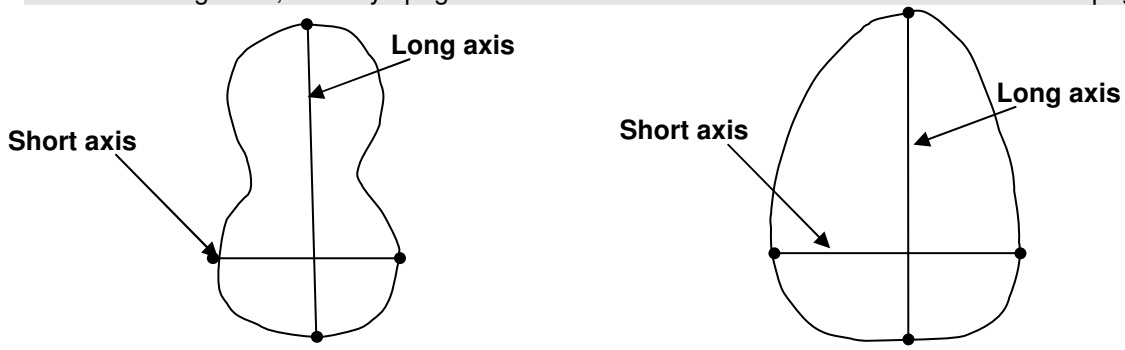


Figure 17. Examples of where to measure canopy widths.

LIVE CANOPY COVER can be based on an ocular estimate when the condition in question is certain to contain greater than 12% LIVE PLUS MISSING CANOPY COVER.

When collected: All CONDITION CLASS STATUS = 1 or 2
Field width: 2 digits
Tolerance: 0 – 12% - No errors
13 – 20% - 10% error
21 – 100 - 25% error
MQO: At least 99% of the time
Values: 00 – 99 (where 99=99-100 %)

2.5.39 LIVE PLUS MISSING CANOPY COVER **[%L+M]**

Record the percentage of LIVE PLUS MISSING CANOPY COVER for the condition by adding the LIVE CANOPY COVER plus the estimated missing canopy cover that existed prior to disturbance (harvesting, fire, chaining, etc). Dead portions of live trees are not considered missing unless it is part of the condition DISTURBANCE. Include live and dead and removed tally trees, saplings, and seedlings. Do not double count canopy layers. Any live canopy supercedes any presence of missing canopy. Ignore portions of missing canopy that have live trees, saplings and seedlings below them. Base the estimate on field observations, aerial photos, historical aerial imagery, and similar evidence of undisturbed conditions. The total of the LIVE PLUS MISSING CANOPY COVER cannot exceed 100%.

SRS Note: Since DISTURBANCE is not collected for CONDITION CLASS STATUS 2 plots, the missing canopy cover is still assessed by means of ground observations and imagery compared to current ground conditions. For example, a pecan orchard damaged by weather (ice, tornado, etc.) may have missing canopy cover associated with it that has occurred since the previous inventory year (SK2) or within the last 5 years (SK1) that has affected more than 1 acre of the condition.

When collected: CONDITION CLASS STATUS = 1 or 2
Field width: 2 digits
Tolerance: 0 – 12% - No errors
13 – 20% - 10% error
21 – 100 - 25% error
MQO: At least 80% of the time
Values: 00 – 99 (where 99=99-100 %)

2.5.40 TOTAL STEMS **[#Stem]**

Record the estimated number of live stems per acre of the condition. Base the estimate on actual stem count of tally tree species within the sample area. When using the subplot method, use the appropriate expansion factor according to tree and plot size to obtain an estimate of the number of live stems per acre. Using microplots (i.e., the subplot method) to estimate stems <5.0 inches diameter in conditions with wide spacing or 'clumping' is discouraged.

When collected: CONDITION CLASS STATUS = 1 or 2
Field width: 5 digits
Tolerance: 10%
MQO: At least 90% of the time
Values: 00000 – 99999

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.

When a subplot center or microplot center cannot be occupied (i.e., Condition Class Status 4 or 5), 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.

If a subplot or microplot was installed incorrectly at the previous visit, the current crew must remeasure the subplot and/or microplot in its present location. A plot note is required on the DRAW sheet's SUBPLOT CONDITION AND BOUNDARY SKETCH noting the location of the subplot and/or microplot. For subplots being established for the first time, the horizontal distance tolerance is +/- 7 feet from the QA location. For microplots being established for the first time, the horizonatal distance tolerance is +/- 1 foot from the QA location.

Once the subplot is established, determine the condition(s) of the subplot. If a forested condition has been previously defined at another subplot, crews must still examine the forested portion of the subplot for plot level variables (i.e., WATER ON PLOT) and other ancillary condition variables (e.g., SRS FIRE and SRS GRAZING) of the previously defined condition to determine if coding changes are warranted to the ancillary and regional condition data or plot level data.

3.1 SUBPLOT NUMBER **[SBPLT]**

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 **[SubSt]**

Indicate whether or not this subplot currently has at least one accessible forest land condition class. In regions measuring the CORE OPTIONAL macroplpot, 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 **[SNSR]**
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

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: 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 [SubCt]
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 **[MicCt]**
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 **[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 to 155

3.7 SUBPLOT ASPECT **[Asp]**
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 predominantly of one direction, code the predominant 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 **[SWD]**

Record to the nearest 0.1 foot the average approximate depth of water (e.g., stream or flooded forest land like cypress swamps) 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.

SRS Note: Code this variable whenever there is measureable water or snow cover on the subplot occupied by accessible forest land that affects measurement quality of seedlings or other tree variables. If this variable is coded due to water, WATER ON PLOT is coded.

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 **[CList]**

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 **[InvSp]**

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

This variable is not collected in WTX or the CARIBBEAN.

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

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
	TREES	
0341	Tree-of-heaven	Ailanthus altissima*
0345	Silktree, Mimosa	Albizia julibrissin*
0712	Princesstree, Royal Paulownia	Paulownia tomentosa*
0993	Chinaberry	Melia azedarach
0994	Tallowtree, Popcorntree	Triadica sebifera, Sapium sebiferum)*
0997	Russian Olive	Elaeagnus angustifolia
	SHRUBS	
2037	Silverthorn, Thorny Olive	Elaeagnus pungens
2038	Autumn olive	Elaeagnus umbellate
2042	Winged Burning Bush	Euonymus alata
2103	Chinese/European privet	Ligustrum sinense*/L. vulgare
2104	Japanese/glossy privet	Ligustrum japonicum*/L. lucidum
2105	Bush honeysuckles	Lonicera spp.*
2113	Sacred bamboo, Nandina	Nandina domestica
2160	Nonnative roses	Rosa spp.
	VINES	
3026	Oriential or Asian bittersweet	Celastrus orbiculatus
3030	Nonnative climbing yams – air yam/chinese yam	Dioscorea bulbifera*/ D. oppositifolia
3042	Wintercreeper	Euonymus fortunei
3071	English Ivy	Hedera helix
3101	Japanese honeysuckle	Lonicera japonica*
3123	Kudzu	Pueraria Montana var. lobata (Pueraria lobata)*
3211	Nonnative Vincas, Periwinkles	Vinca minor/V. major
3251	Chinese/Japanese wisteria	Wisteria sinensis*/ W. floribunda
	GRASSES	
4008	Giant reed	Arundo donax
4051	Tall fescue	Lolium arundinaceum*
4055	Cogongrass	Imperata cylindrica*
4080	Nepalese browntop	Microstegium vimineum*
4085	Chinese silvergrass	Miscanthus sinensis*
4130	Nonnative bamboos	Phyllostachys spp., Bambus spp.
	FERNS	
5171	Japanese climbing fern	Lygodium japonicum*
	FORBS/HERBS/OTHER HERBACEOUS	
6002	Garlic mustard	Alliaria petiolata*
6052	Shrubby lespedeza	Lespedeza bicolor
6053	Chinese lespedeza	Lespedeza cuneata*
6095	Tropical soda apple	Solanum viarum*

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

3.11 SRS NONNATIVE INVASIVE PERCENT COVERAGE **[%Cov]**

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%.

This variable is not collected in WTX or the CARIBBEAN.

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%

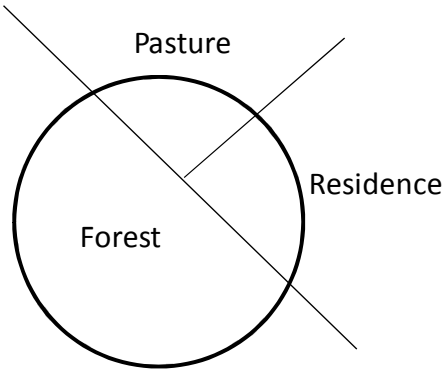
4.0 BOUNDARY REFERENCES

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.

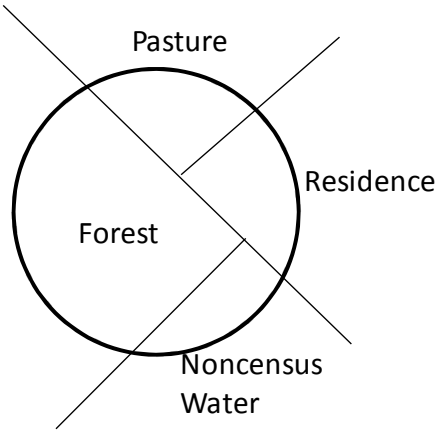
In addition to using the recording procedures described herein, sketch maps of condition class boundaries onto the pre-printed plot diagrams on paper field tally sheets.

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). See example illustrations below.

In this example, the forested subplot has two conditions defined: Condition Class Status 1 (SRS LU = 01 or 02) and Condition Class Status 2 (SRS LU = 12). Only the first nonforest land use from North is defined. Therefore, the residence is not defined as a separate condition class.



In this example, the forested subplot has three conditions defined: Condition Class Status 1 (SRS LU = 01 or 02), Condition Class Status 2 (SRS LU = 12) and Condition Class Status 3 (SRS LU = 92). The residence is still not defined as a separate condition class.



In this example, the subplot has no accessible forestland. The only "nonforest" condition defined is the census water as Condition Class Status 4 (SRS LU = 91).

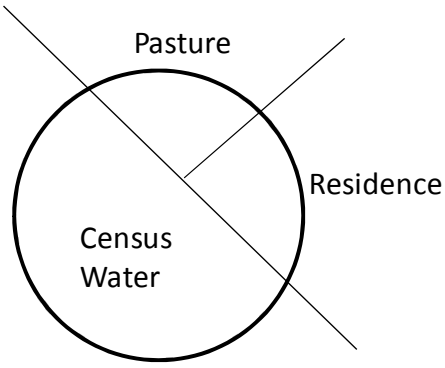


Figure 14a. Delineating subplots with multiple "nonforest" land uses.

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.

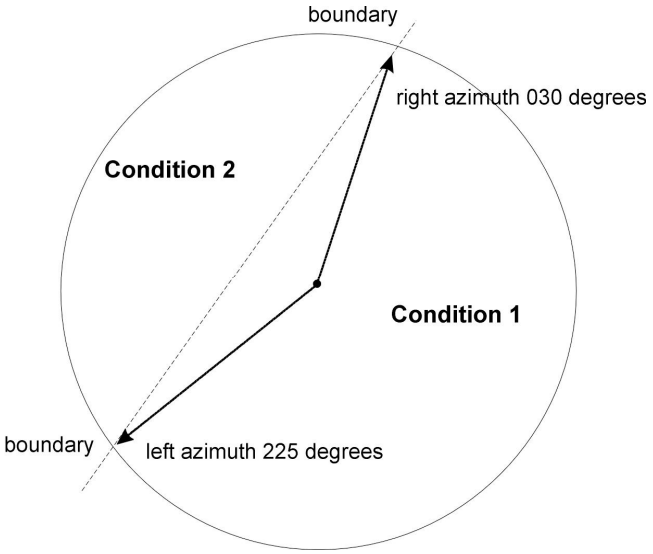


Figure 15. How to measure a straight boundary on a microplot, subplot, or macroplot.

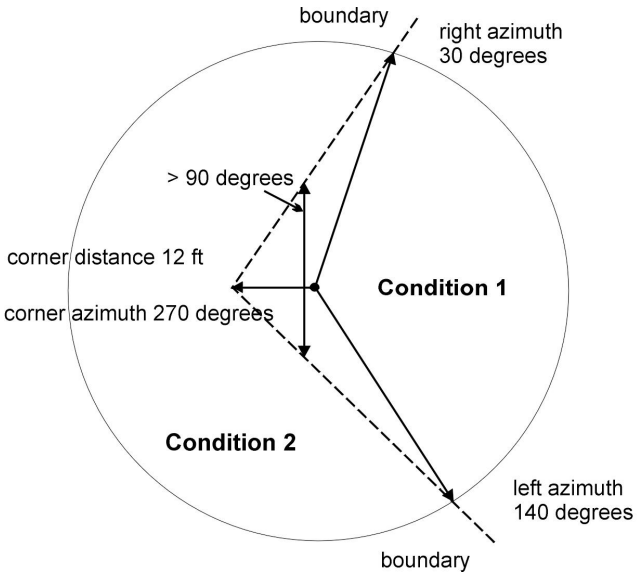


Figure 16. How to measure a boundary with a corner on a subplot or macroplot.

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 [SBPLT]

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 **[PType]**

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 **[BChg]**
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
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
2 Cruiser error – new boundary, or boundary has been changed or deleted to correct an error from previous crew
3 Procedural change - new boundary, or boundary has been changed or deleted to reflect a change in variable definition

4.2.4 CONTRASTING CONDITION **[CCond]**
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 **[LAzi]**
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 **[CAzi]**
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 **[CDis]**

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 **[RAzi]**

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

4.2.9 SRS BOUNDARY STATUS **[BStat]**

On SAMPLE KIND = 2 plots only, record the appropriate code indicating if the previous boundary is to be a new boundary or is a remeasured boundary with or without change. Remeasurement boundaries that are no longer present on the subplot should be deleted in the data recorder using the 'Delete Record' function.

When collected: All boundaries on SAMPLE KIND = 2
Field width: 1 digit
Tolerance: No errors
MQO: At least 99% of the time
Values:

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.

On naturally swelled-butted trees (e.g., baldcypress, pondcypress, swamp tupelo, water tupelo, Carolina ash), total tree length and crown ratio is determined 4.5 feet below the recorded LENGTH TO DIAMETER MEASUREMENT POINT. This point is the base of the tree. Cull, tree class, tree grade are determined 3.5 feet below the recorded LENGTH TO DIAMETER MEASUREMENT POINT. This point is the base of the butt log. See TOTAL LENGTH for illustration.

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) or the subplot numbers were switched, use the following procedures:

- assign the appropriate present CONDITION CLASS STATUS Code(s) to the 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 **[SBPLT]**
Record the subplot number where the tree occurs.

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 **[REC#]**
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;
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 **[Cond#]**
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).

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

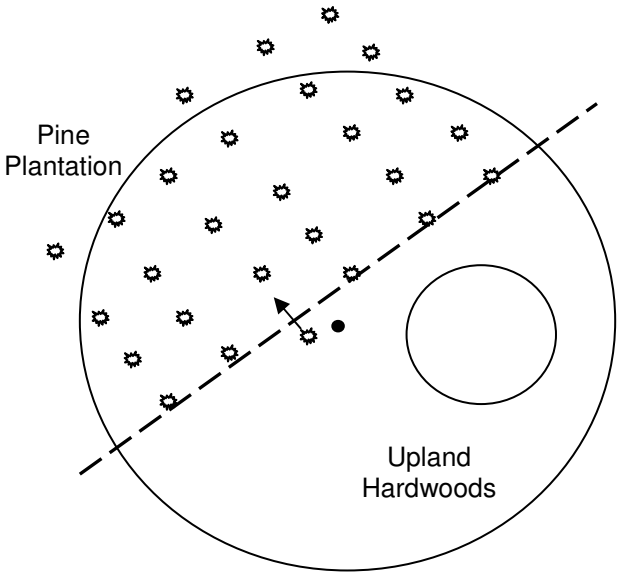


Figure 17. Ragged CONDITION CLASS boundary and tree condition class designation.

5.4 AZIMUTH **[Azi]**

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 **[Dist]**

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.

Note: To determine the pith center of a tree is difficult. Horizontal distance is measured to the center of the tree that is a perpendicular line from the pin center.

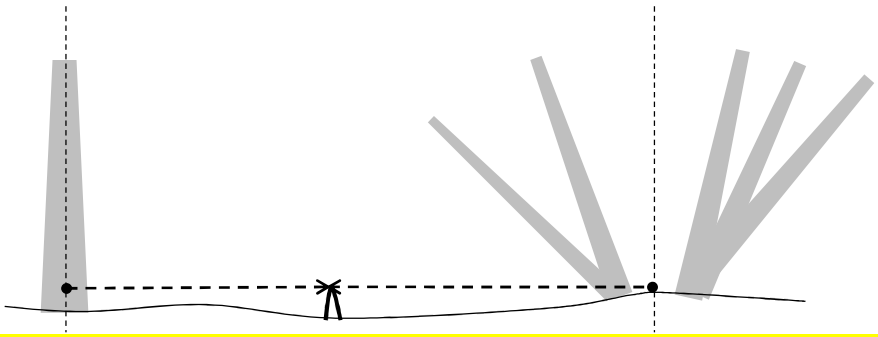


Figure 17a. Horizontal distance measurement to single stem v. multistemmed woodland tree.

Crews must take extra time when measuring new trees on the outer edge of the subplot and/or microplot. New trees are either in the fixed radius plot or not. It is unacceptable to tally a tree beyond the dimensions of the fixed radius plot. For remeasure trees, crews must consider whether the pin location is correct when the pin is not found. An error in pin placement may result in trees that were previously tallied as in to be out and vice versa.

When Collected: All live tally trees ≥ 1.0 in DBH/DRC and standing dead tally trees ≥ 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 **[PStat]**

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 ≥ 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 **[TStat]**

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 ≥ 1.0 in DBH/DRC
All new dead tally trees ≥ 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.

On remeasurement plots, a new tree (ingrowth) may be present at the location of a previously tallied tree that has died and does not qualifiy as STANDING DEAD. (See variable 5.9.2 DBH, Stump Sprouts.)

5.7.1 RECONCILE **[Reco]**

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 **[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.

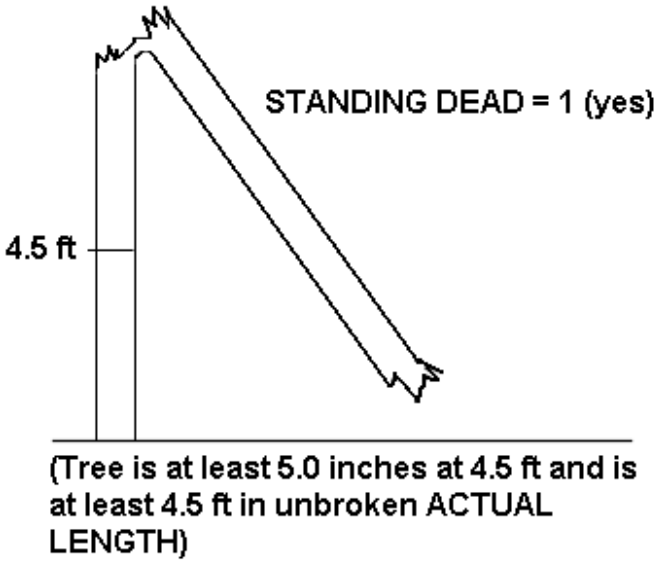


Figure 18. Example of an unbroken bole to 4.5 feet.

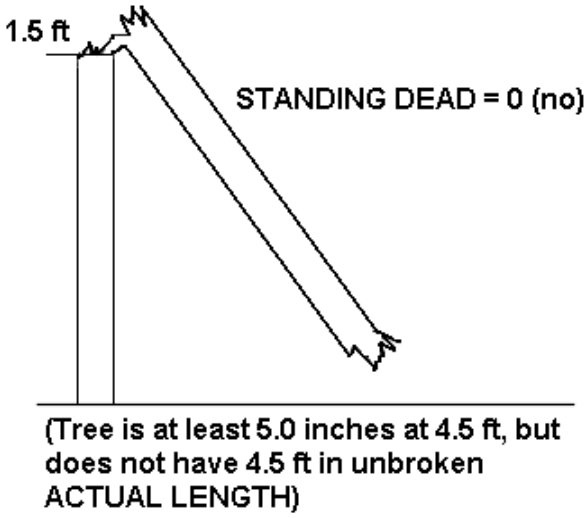


Figure 19. Example of an unbroken length of < 1.5 feet.

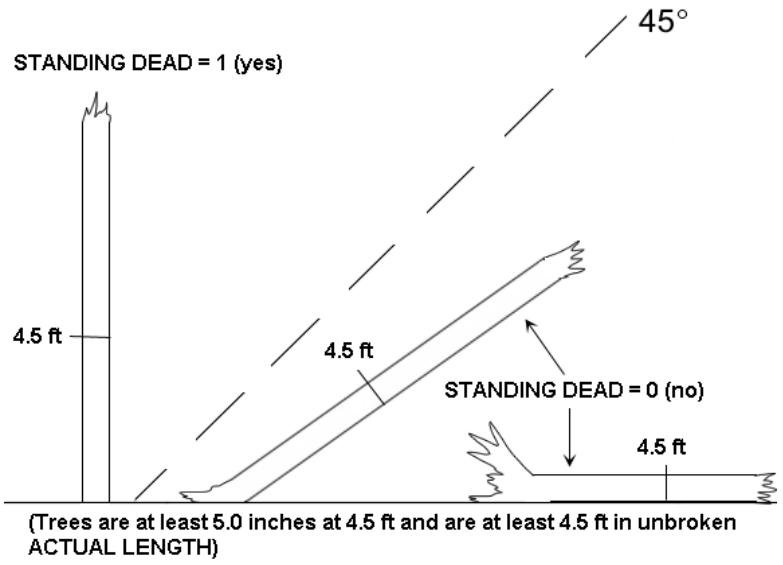


Figure 20. Other examples of dead trees.

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 **[SPP]**

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 **[Diam]**

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.

SRS Note: Trees are not permanently marked at the point of measurement except DRC stems and these should be marked at the point of measurement with crayon or chalk. If a measurement point is not 4.5 feet, the LENGTH TO DIAMETER MEASUREMENT POINT is a required entry (see 5.24). In addition trees are not marked with a slash or any other mark (unless it's a witness or a reference tree to a subplot) to indicate tallied trees. Flagging may be used to temporarily mark tally trees. Trees that are checked and are just beyond 24.0 ft can be marked with a small "x" at the base of the tree facing the pin.

Remeasurement trees:

When remeasuring the diameter of a live 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 measuring the diameter of a dead tree tallied at a previous survey, always take the measurement at the same location as the previous crew.

When Collected: All live tally trees ≥ 1.0 in DBH/DRC and standing dead tally trees ≥ 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
+/- 0.5 in per 20.0 in increment of measured diameter trees that are measured with a wedge prism and horizonatal limiting distance table or pentaprism; and all estimated trees ≥ 5.0 in
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 **[PrDia]**

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 or stems 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.

   - Trees forked between or at 1.0 foot and below 4.5 feet. Trees forked between or at 1.0 foot and below 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.

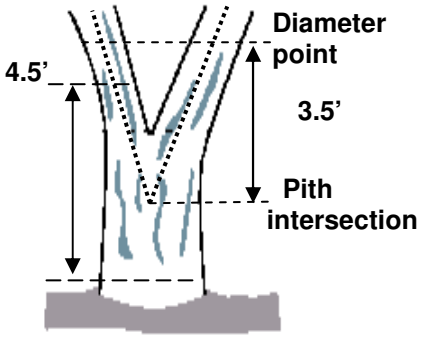
     

     Figure 22. Forked between 1.0-4.5 ft.

     Multiple forks are possible if they all originate from approximately the same point on the main stem and meet the requirements of a fork (at least 1/3 the diameter and angle 45 degrees or less). In such cases, measure DBH on all stems at 3.5 feet above the common pith intersection (Figure 24-F).

     Diameter measurement due to a fork is to be taken 3.5 feet above the pith separation or at a "reasonable" reach that is repeatable for remeasurement by the next crew. This measurement point is recorded as the LENGTH TO DIAMETER MEASUREMENT POINT (see 5.24).

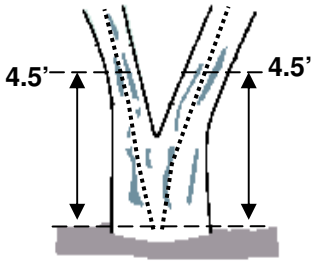
     

     Figure 21. Forked below 1.0 ft.

     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.

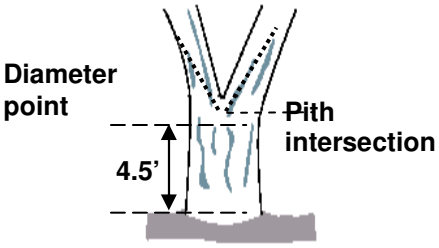
     

     Figure 23. One tree.

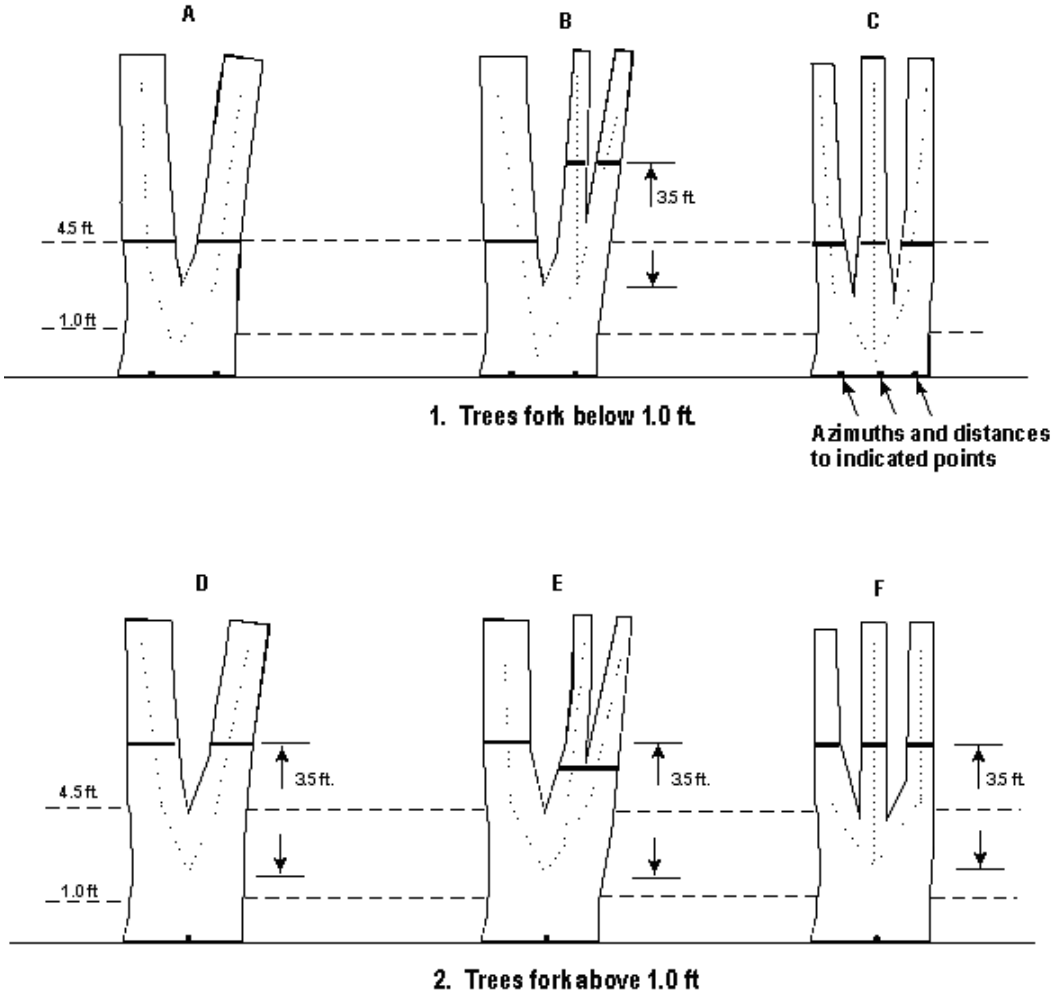
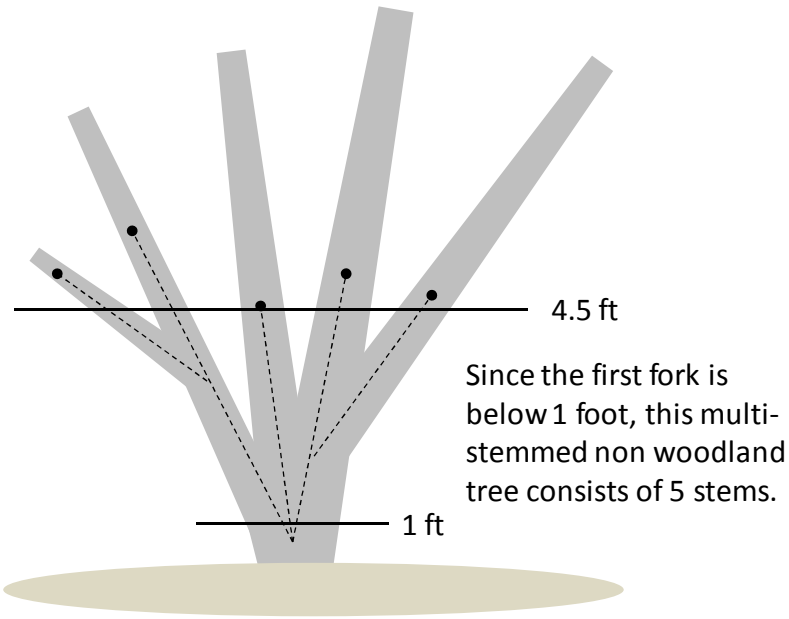


Figure 24. Summary of where to measure DBH, distance, and azimuth on forked trees.



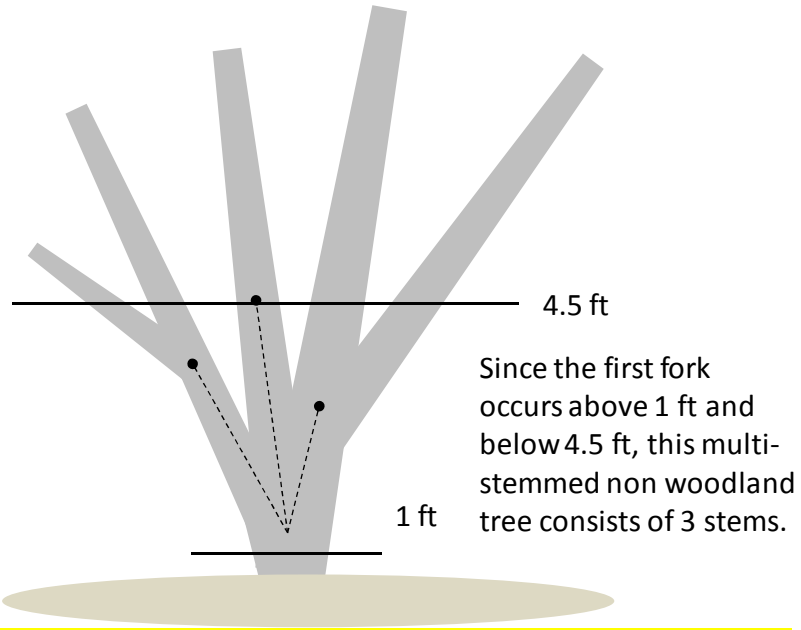


Figure 24a. The difference between recognizing the second fork as an additional stem depends on where the first fork occurs.

SRS Note: When is a fork no longer considered a fork? If one of the stems that created the fork dies or breaks, the stem is still considered a fork until no evidence of it remains. If no evidence of the second stem is present, the previous high or low diameter location may or may not represent the best location to monitor growth for the tree. This most commonly occurs with saplings that have measureable forks during the sapling stage, but one of the stems that created the fork breaks off or dies as the sapling matures to a tree. If this occurs, the measurement point for the tree should be returned to 4.5 feet unless the old location is within 1 foot of 4.5 feet or the old location is still suitable as a diameter measurement point.

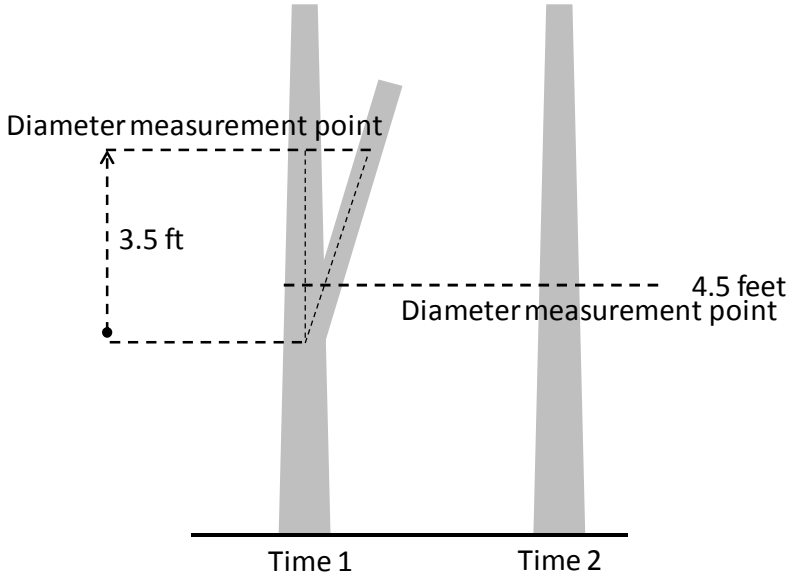


Figure 24b. This illustrations depicts the diameter locatons of a forked tree at Time 1 and the new diameter location at Time 2 when the fork is no longer evident.

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 or at 1.0 foot and below 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.

3. Tree with butt-swell, bottleneck or buttress roots: Measure these trees 1.5 feet above the end of the swell, bottleneck or buttress if the swell, bottleneck or buttress 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 or Supplement B for tables and complete directions for using a prism.

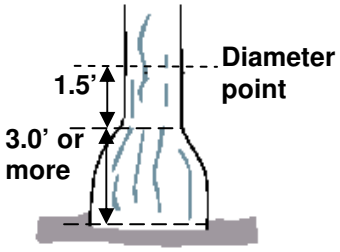


Figure 25. Bottleneck tree.

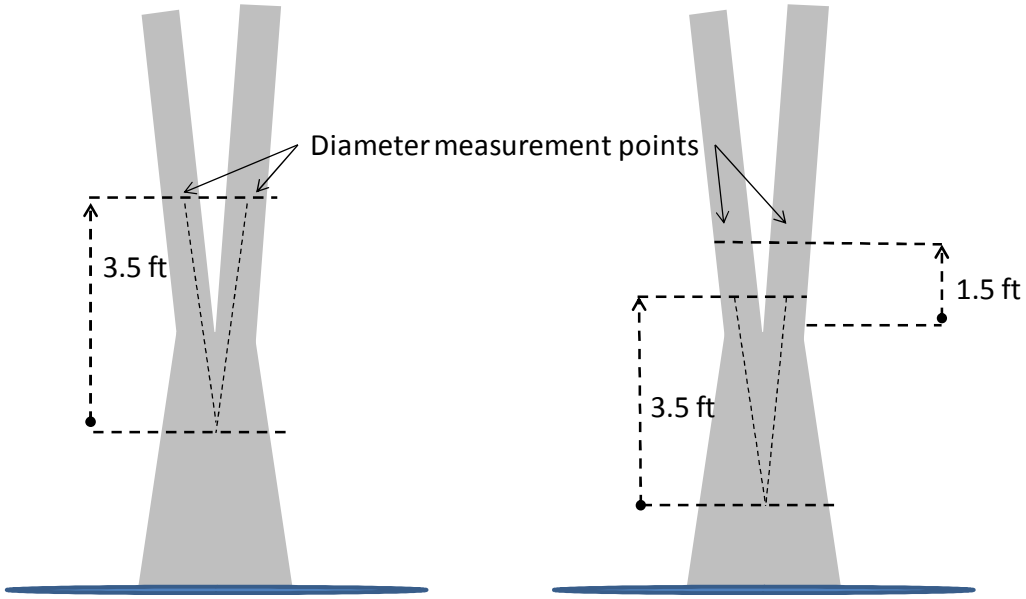


Figure 25a. For naturally swelled-butted trees that are forked, the 3.5 foot from pith intersection rule still applies unless the new diameter point is within 1.5 feet of the top of the swell. If this occurs, the diameter location is taken 1.5 above the swell.

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. If this point is not reachable for measure, the diameter is estimated.

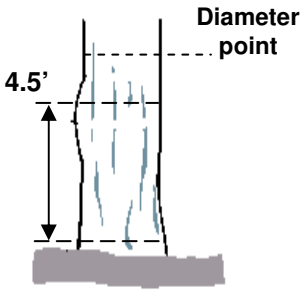


Figure 26. Tree with swelling.

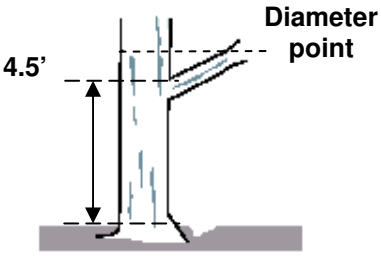


Figure 27. Tree with branch.

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).

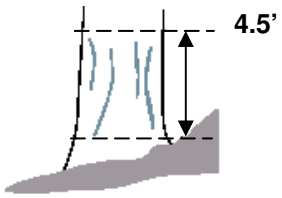


Figure 28. Tree on a slope.

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).

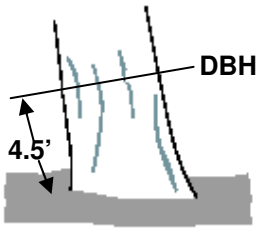


Figure 29. Leaning tree.

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).

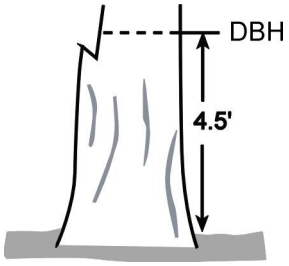


Figure 30. Tree with part of stem missing.

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

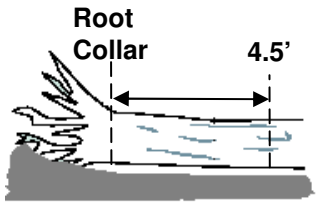


Figure 31. Tree on the ground.

11. Down live tree with tree-form branches growing vertical from main bole: When a down live tree, touching the ground or the main bole is leaning and close to being parallel to the surface of 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 at or between 1.0 feet and 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.

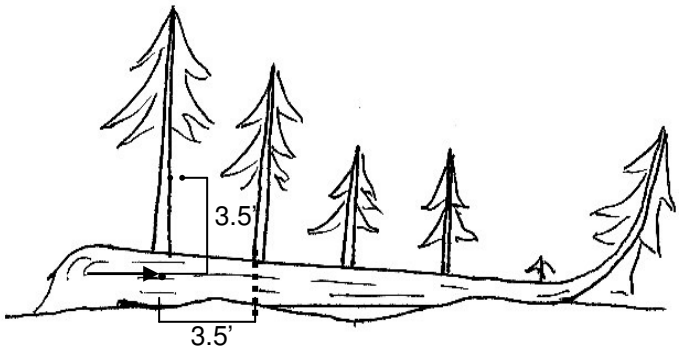


Figure 32. Down tree above duff.

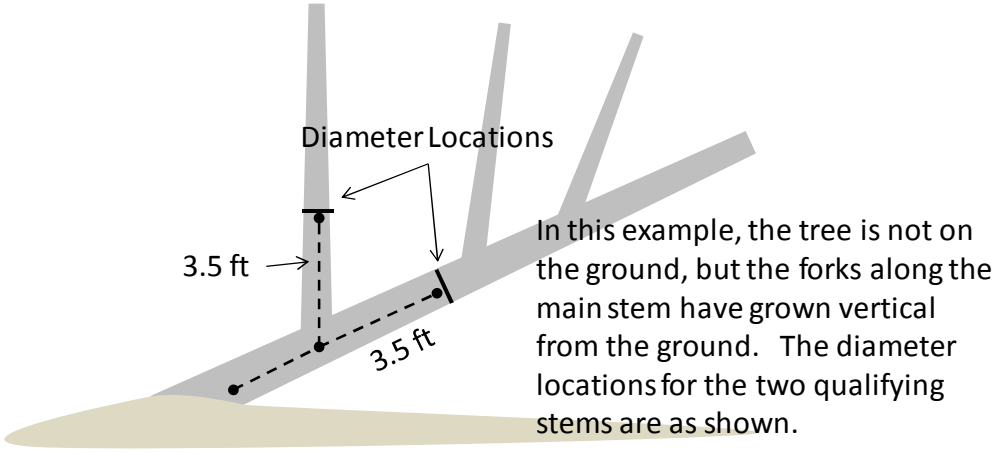


Figure 32a. Leaning tree with vertical forks.

- 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.

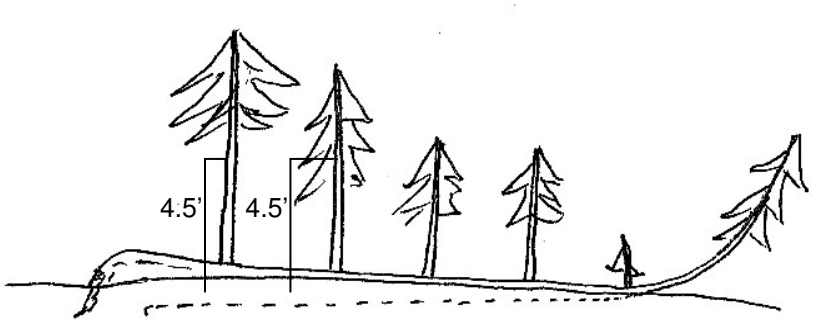


Figure 33. Down tree below duff.

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

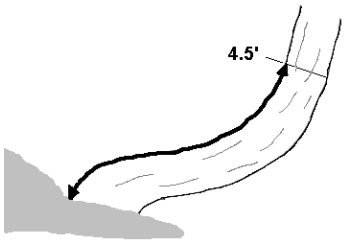


Figure 34. Tree with curved bole (pistol butt tree).

13. Tree growing on objects or with adventitious roots: When trees are growing on objects, such as rocks or logs, measure at 4.5 feet above the root crown or collar rather than above the forest floor. (Figure 34.1). [*Source: FSH2409.12-2000*] Trees that reside in water much of the year can also produce "prop-like" roots or adventitious roots. Diameter is measured in a similar method at 4.5 feet above the root crown or collar. Note: For species with adventious roots, choosing a diameter location and determining the root collar will be variable. For repeatable diameter measurements, the LENGTH TO DIAMETER MEASUREMENT POINT is measured from the ground and not the collar for trees growing on objects or with adventitious roots.

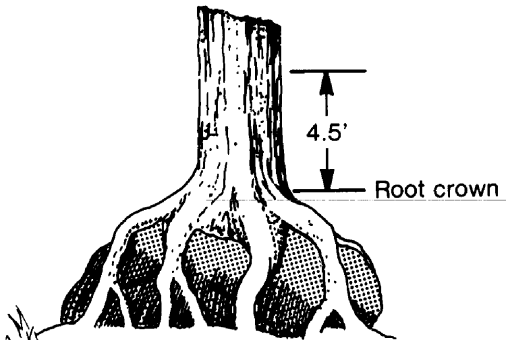


Figure 34.1. Trees growing on objects (e.g., rocks, logs).

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) **[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:

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

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:

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

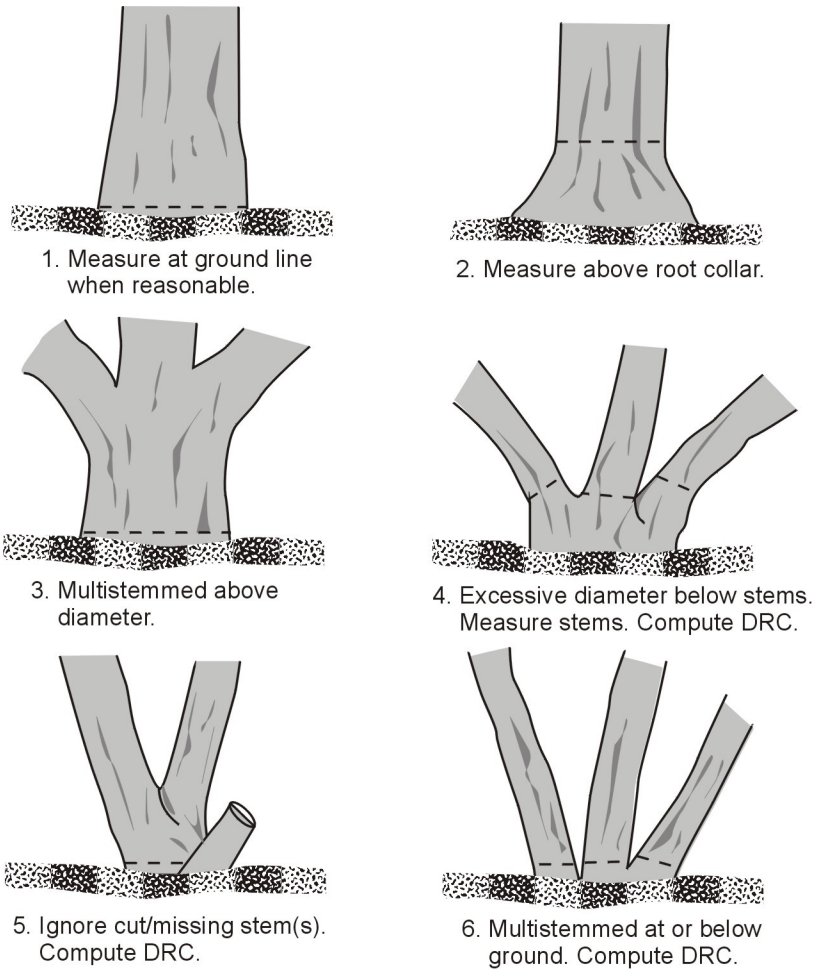


Figure 35. How to measure DRC in a variety of situations.

5.9.4.1 DRC STEM DIAMETER **[Di1, Di2, Di3, etc.]**
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 **[St1, St2, St3, etc.]**
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 **[#Stem]**

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 **[DChck]**

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 (i.e, diameter tape, wedge prism and pentaprism).
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 **[%ROT]**

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), and all standing dead tally trees greater than or equal to 5.0 inches DBH/DRC (CORE OPTIONAL).

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 that is not suitable for pulpwood. 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.

On naturally swelled-butted trees (e.g., baldcypress, pondcypress, water tupelo, swamp tupelo, Carolina ash) cull is determined 3.5 feet below the recorded LENGTH TO DIAMETER MEASUREMENT POINT. This point is the base of the butt log. No cull is assessed below this point. See TOTAL LENGTH for illustration.

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 and standing dead tally trees ≥ 5.0 in DBH/DRC
Field width: 2 digits
Tolerance: +/- 10 %
MQO: At least 90% of the time
Values: 00 to 99

5.14 TOTAL LENGTH **[ToLen]**

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. If a tree is leaning or the tree structure has multiple lateral type forking and branching (e.g., live oak), traditional methods of determining length will not be applicable. Crews should use the best means to determine length. This can be the "string" method. Where a "string" is used to approximate the leaning length and then held at a vertical angle to measure the length with either a clinometer or hypsometer. Or if the lean is severe enough, a logger's tape can be used at ground level to determine the length.

For palms, the total length is measure to the terminal bud and not the top of the fronds.

On naturally swelled-butted trees (e.g., baldcypress, pondcypress, water tupelo, swamp tupelo, Carolina ash) length is determined 4.5 feet below the recorded LENGTH TO DIAMETER MEASUREMENT POINT. This point is the base the tree. No length is included below this point. See Figure 35a.

When Collected: All live tally trees ≥ 1.0 in DBH/DRC and all standing dead tally trees ≥ 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

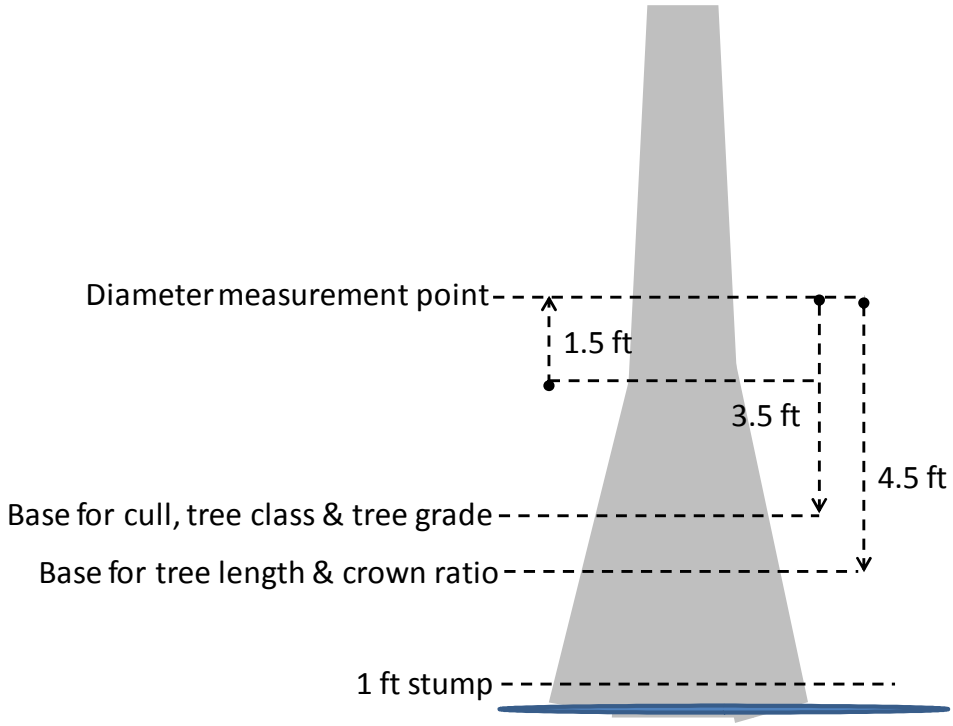


Figure 35a. For the buttressed species, the variables of tree length, crown ratio, cull (board foot and cubic), tree class and tree grade are assessed as depicted in the above diagram. For these types of trees, the base for the tree length starts 4.5 ft below the diameter measurement point. The base to assess cull, tree class and tree grade, if applicable, starts 3.5 ft below the diameter measurement point.

5.15 ACTUAL LENGTH **[AcLen]**

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). See Figure 35b. Forked trees should be treated the same as unforked trees.

Live trees that are bowed over (leaning) with dead tops follow the same rule as above. Branches cannot become new leaders until the diameter is 1/3 the diameter at the point of the break. If the dead top is intact, a live branch can only become the new leader when the diameter at the point of attachment is of equal size to the dead intact leader.

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

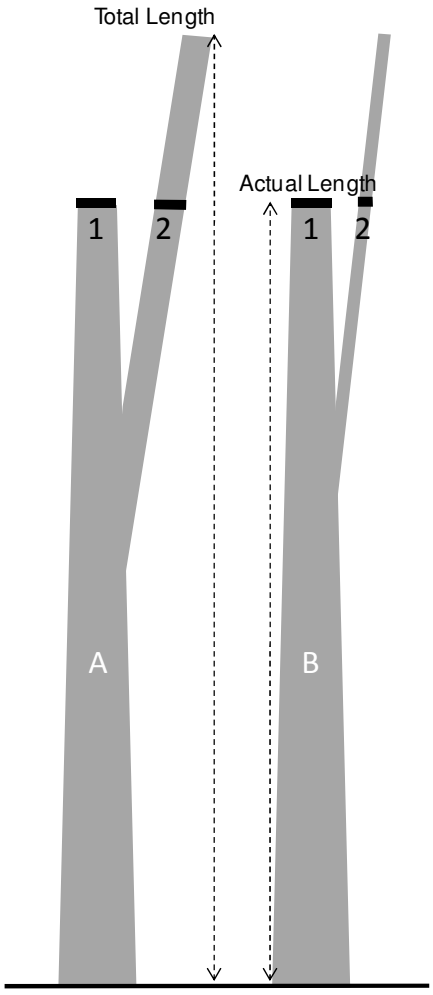


Figure 35b. Total length v actual length on trees with broken stems. Tree A has a recovered top, because stem 2 is at least 1/3 the diameter of stem 1 at the point of the break. Total Length for tree A is measured from stem 2 (top of the tree). Tree B has not recovered, because stem 2 is less than 1/3 of the diameter of stem at the point of the break. Actual Length for tree B is measured to the break point of stem 1 and Total Length is estimated.

5.16 LENGTH METHOD **[Meth]**
Record the code that indicates the method used to determine tree lengths.

When Collected: All live tally trees ≥ 1.0 in DBH/DRC and all standing dead tally trees ≥ 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 **[CrCls]**

Rate tree crowns in relation to the sunlight received and proximity to neighboring trees not its position in the canopy. (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 ≥ 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.

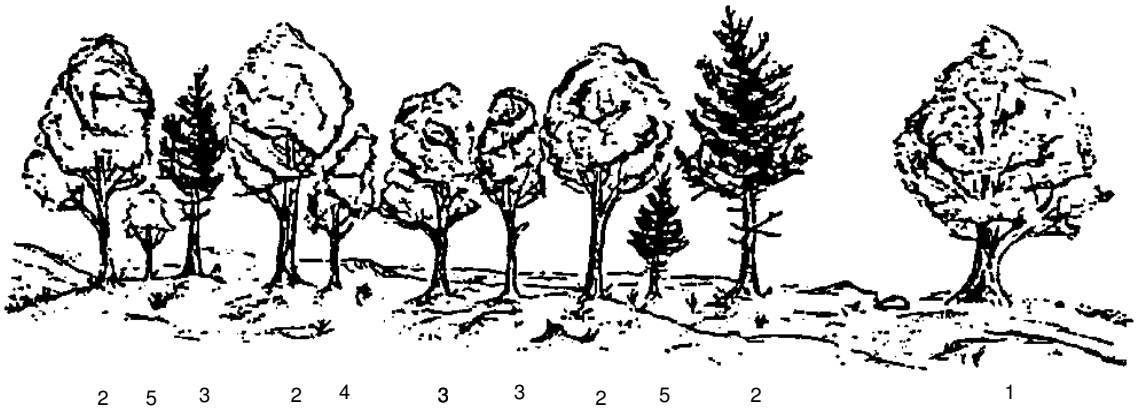


Figure 36. Examples of CROWN CLASS code definitions. (Numbers are the CROWN CLASS codes).

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.

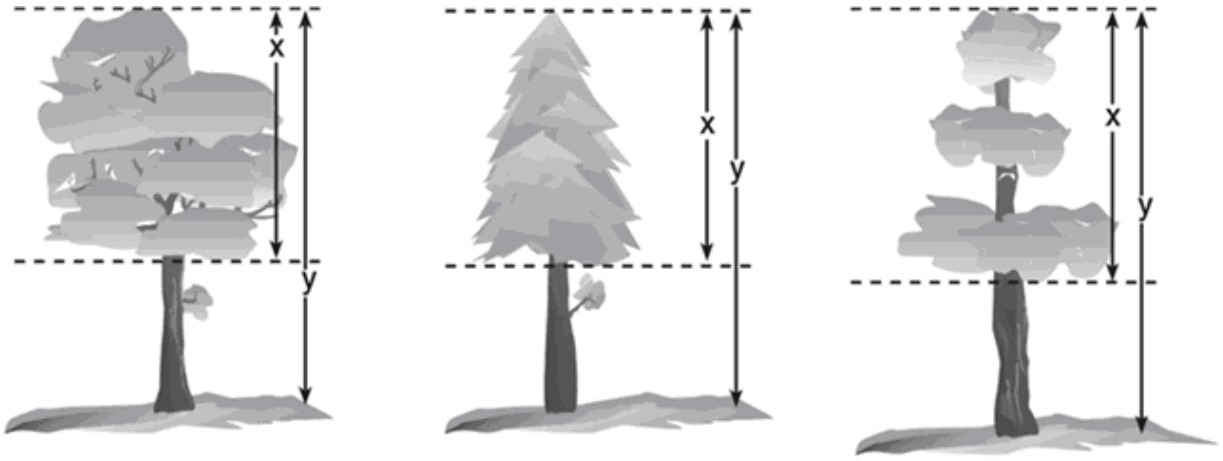
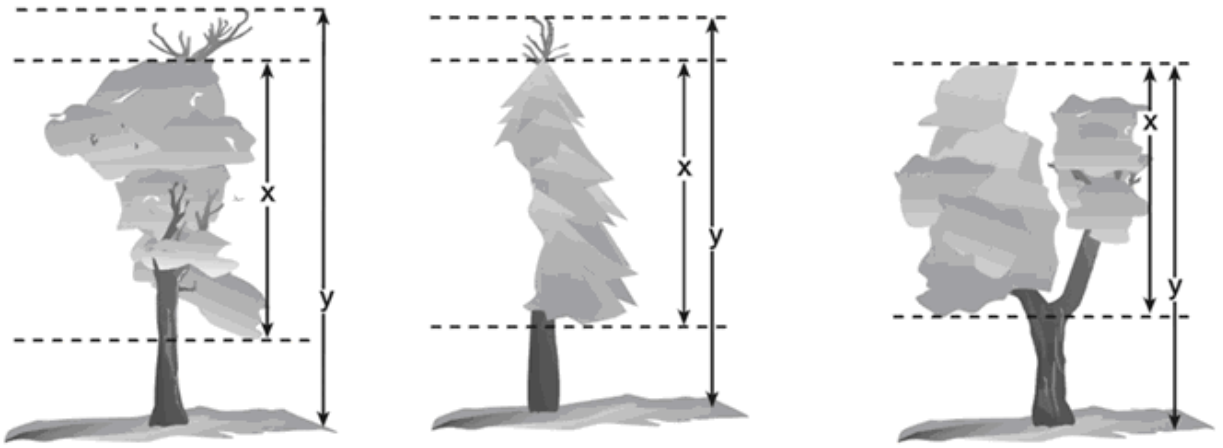


Figure 37a. UNCOMPACTED LIVE CROWN RATIO examples.



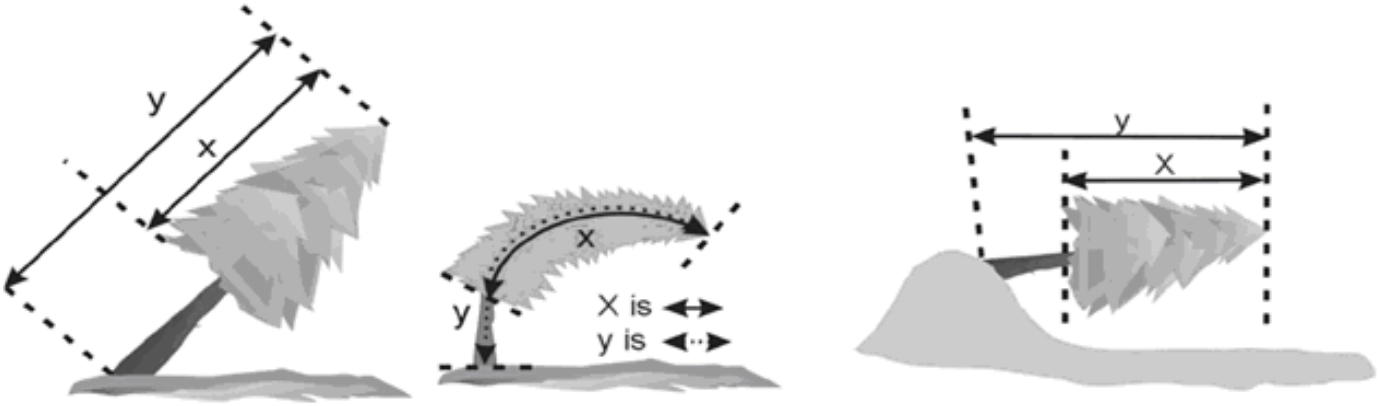


Figure 37b. UNCOMPACTED LIVE CROWN RATIO examples.

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 ≥ 1.0 in DBH/DRC
Field width: 2 digits
Tolerance: +/- 10%
MQO: At least 90% of the time
Values: 00 to 99 percent

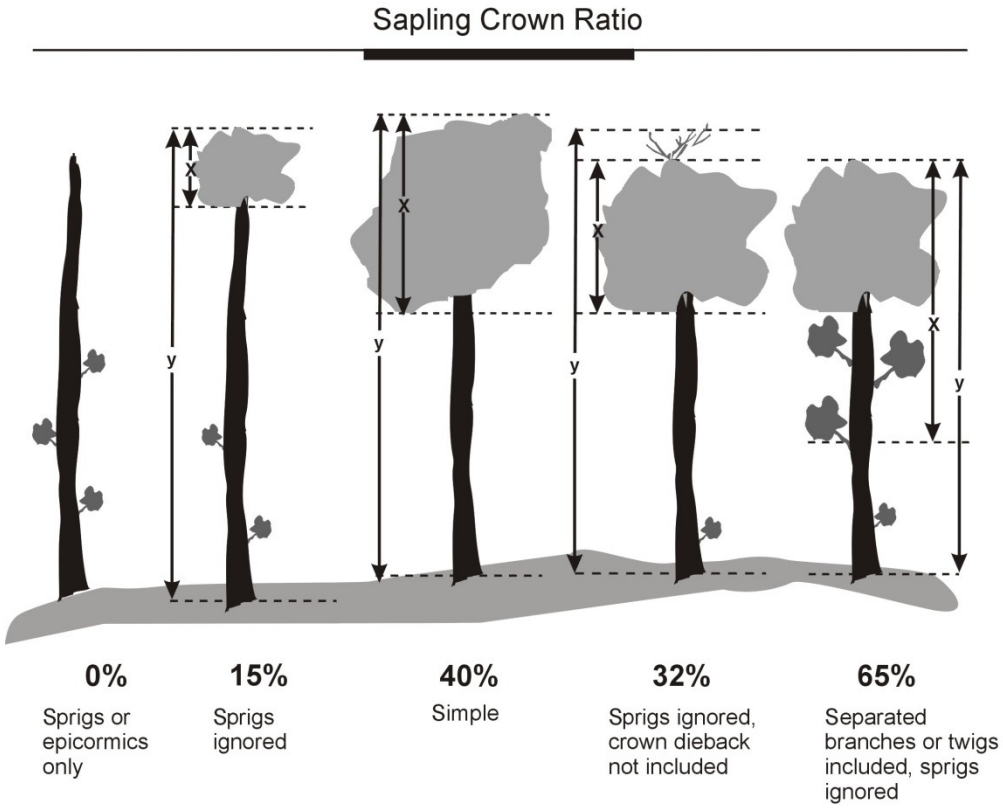


Figure 38. Sapling ratio determination examples.

5.19 COMPACTED CROWN RATIO **[CrRat]**

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.

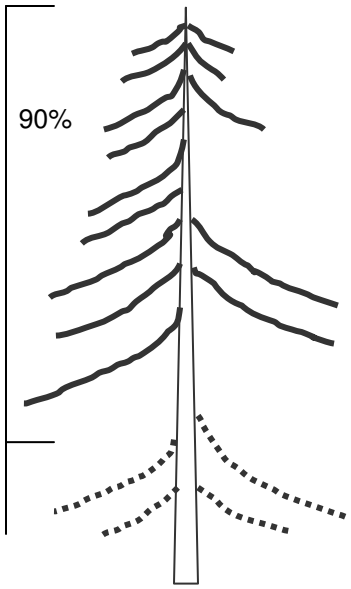
Epicormic branches are not considered when estimating the compacted crown ratio. Epicormic branches remain classified as such until they reach the size of regular branches. For trees that had 1.0 inch or larger branches when the epicormic branches formed, epicormic branches are considered regular branches once they reach 1.0 inch in diameter.

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.

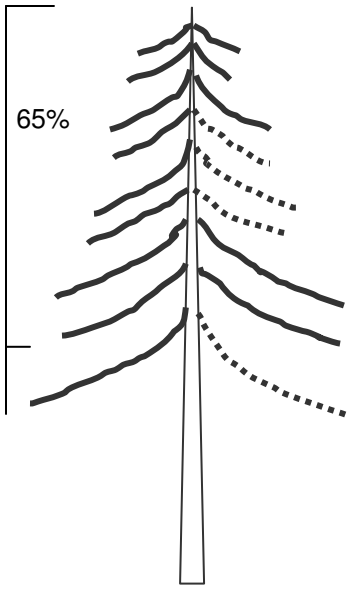
On naturally swelled-butted trees (e.g., baldcypress, pondcypress, water tupelo, swamp tupelo, Carolina ash) crown ratio is determined 4.5 feet below the recorded LENGTH TO DIAMETER MEASUREMENT POINT. This point is the base the tree.

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

Uncompacted:

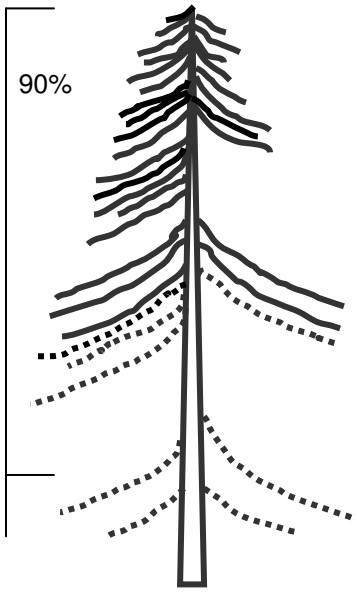


Compacted:



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

Uncompacted:



Compacted:

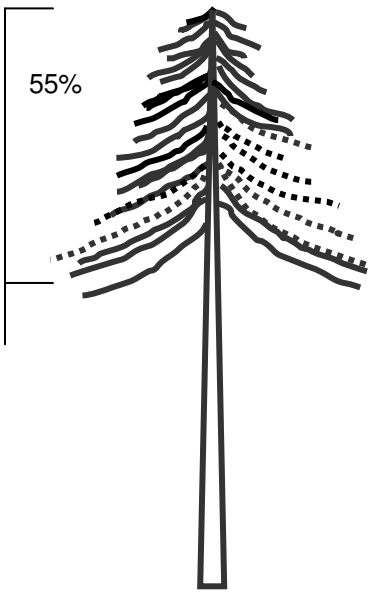


Figure 39. Examples of and comparison between COMPACTED CROWN RATIO and UNCOMPACTED LIVE CROWN RATIO of conifers.

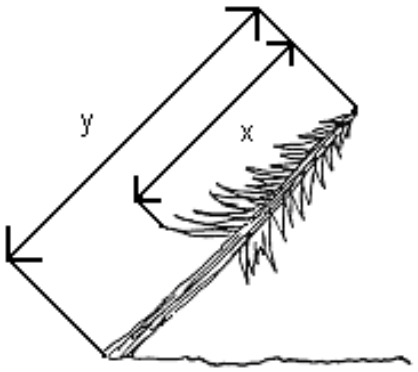


Figure 40. COMPACTED CROWN RATIO on a leaning tree. CROWN RATIO = (x/y)100.

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

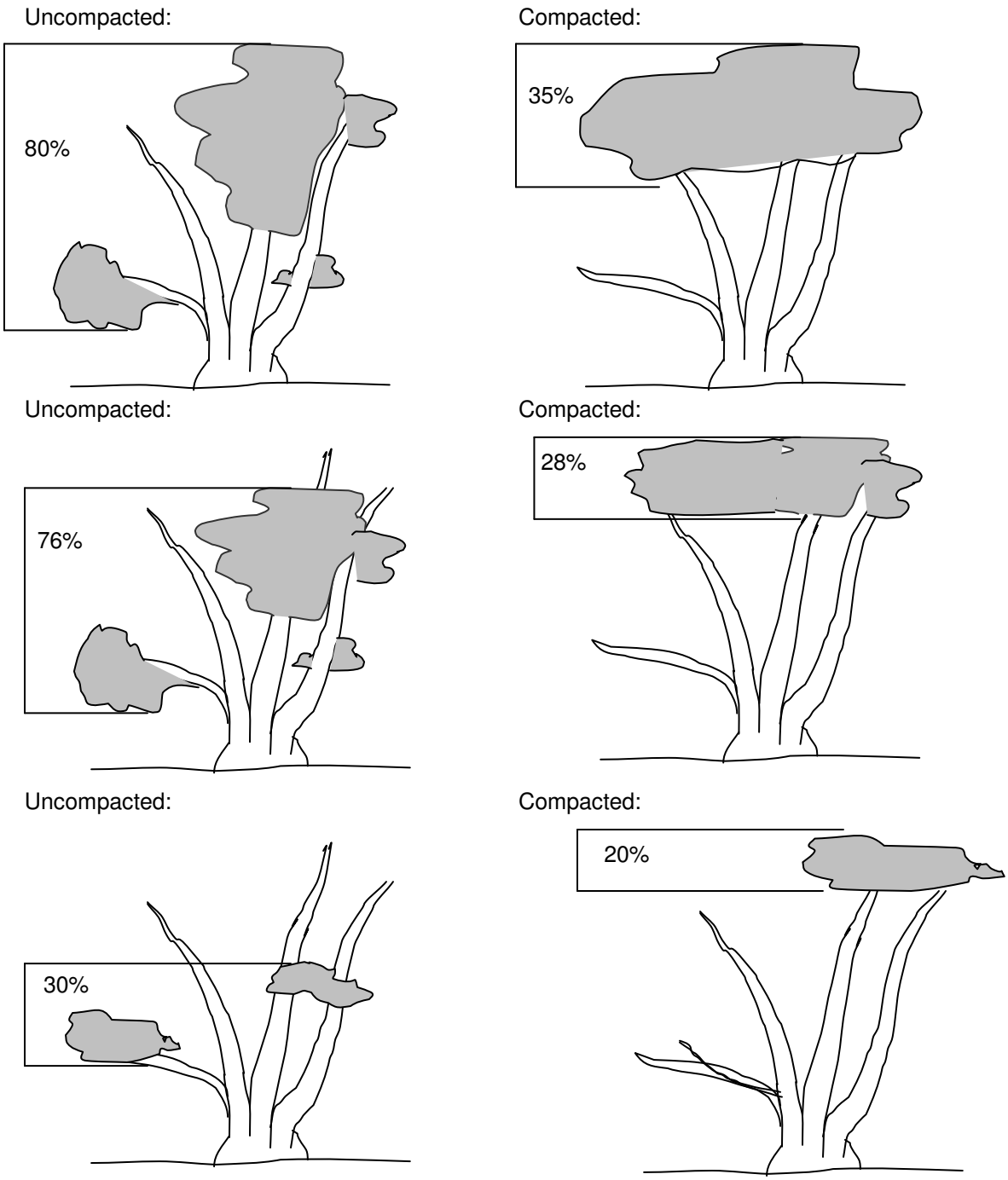


Figure 41. Examples of and comparison between COMPACTED CROWN RATIO and UNCOMPACTED LIVE CROWN RATIO of woodland species.

5.20 Tree Damage **(CARIBBEAN Only)**

Record up to two different damages per tree. Damage is characterized according to three attributes: location of damage, type of damage, and severity of damage. Damages must meet severity thresholds (defined in section 5.20.3, DAMAGE SEVERITY) in order to be recorded.

The tree is observed from all sides starting at the roots. Damage signs and symptoms are prioritized and recorded based on location in the following order: roots, roots and lower bole, lower bole, lower and upper bole, upper bole, crownstem, and branches recorded as DAMAGE LOCATION 1-9, or record location code 0 (for no damage).

Within any given location, the hierarchy of damage follows the numeric order of DAMAGE TYPE possible for that location. The numeric order denotes decreasing significance as the code number goes up, i.e., DAMAGE TYPE 01 is more significant than DAMAGE TYPE 25. A maximum of two damages are recorded for each tree. If a tree has more than two damages that meet the threshold levels, the first two that are observed starting at the roots are recorded.

When multiple damages occur in the same place, the most damaging is recorded. For example, if a canker, DAMAGE TYPE 02, meets the threshold and has a conk growing in it, record only the canker. Another example: if an open wound meets threshold and also has resinosis, record only the open wound.

5.20.1 DAMAGE LOCATION 1 (CORE OPTIONAL) **[DILoc1]**

Record the location on the tree where DAMAGE TYPE 1 is found (Figure 42). If the same damage continues into two or more locations, record the appropriate code, or if the combination of locations does not exist (damage extends from crownstem to roots), record the lowest location that best describes the damage (see Figure 43). Multiple damages may occur in the same location, but record the higher priority damage (lower code number) first. If the damages are coincident (a conk within a canker), record only the higher priority damage.

The “base of the live crown” is defined as the horizontal line which would touch the lowest part of the foliage, excluding branches towards the base of the tree which are less than 1.0 inch or more than 5 feet from the rest of the crown. See Section 5.18 (UNCOMPACTED LIVE CROWN RATIO) for more details.

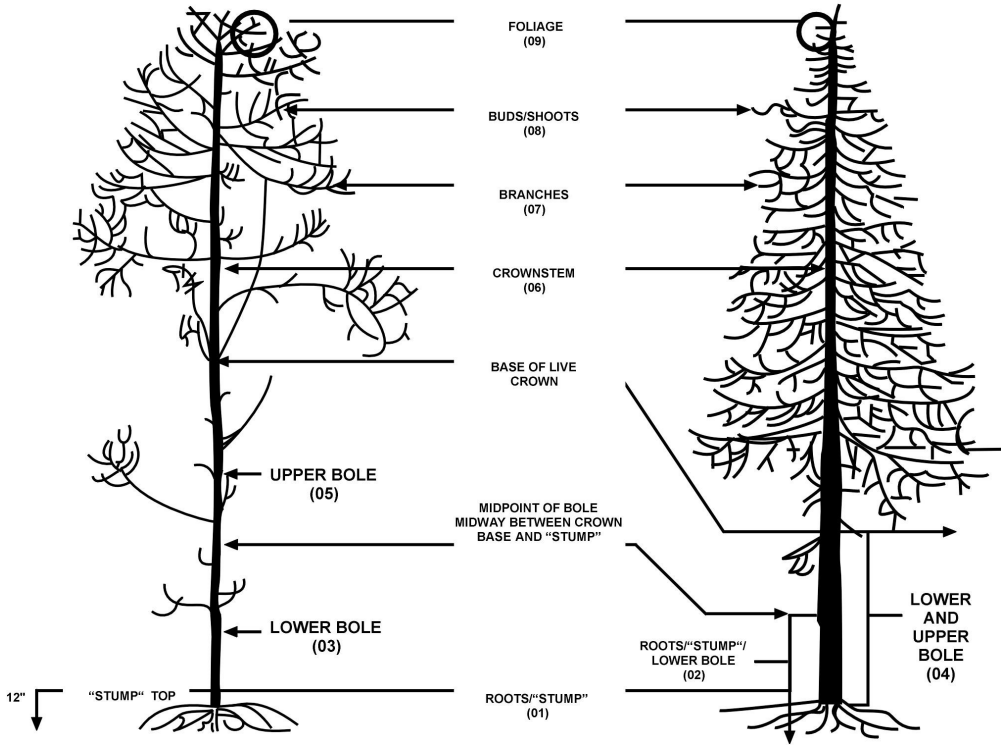


Figure 42. Location codes for damage.

When Collected: CORE OPTIONAL: All live tally trees ≥ 5.0 in DBH/DRC **(CARIBBEAN Only)**
CORE OPTIONAL: All live tally trees ≥ 1.0 in DBH/DRC
Field width: 1 digit
Tolerance: +/- 1 location class
MQO: At least 80% of the time
Values:

0 No damage.

1 Roots (exposed) and stump (12 inches in height from ground level)
For woodland species only: Since branches often originate below 12 inches, Location 1 should include the roots but stop where the branches originate, if that occurs below the 12-inch stump height. Any damage (open wound, etc.) found on a branch that originates below 12 inches should be given Location 7 (branches).

2 Roots, stump, and lower bole .

3 Lower bole (lower half of the trunk between the stump and base of the live crown).

4 Lower and upper bole.

5 Upper bole (upper half of the trunk between stump and base of the live crown).

6 Crownstem (main stem within the live crown area, above the base of the live crown).

7 Branches (>1 in at the point of attachment to the main crown stem within the live crown area).

8 Buds and shoots (the most recent year's growth).

9 Foliage.

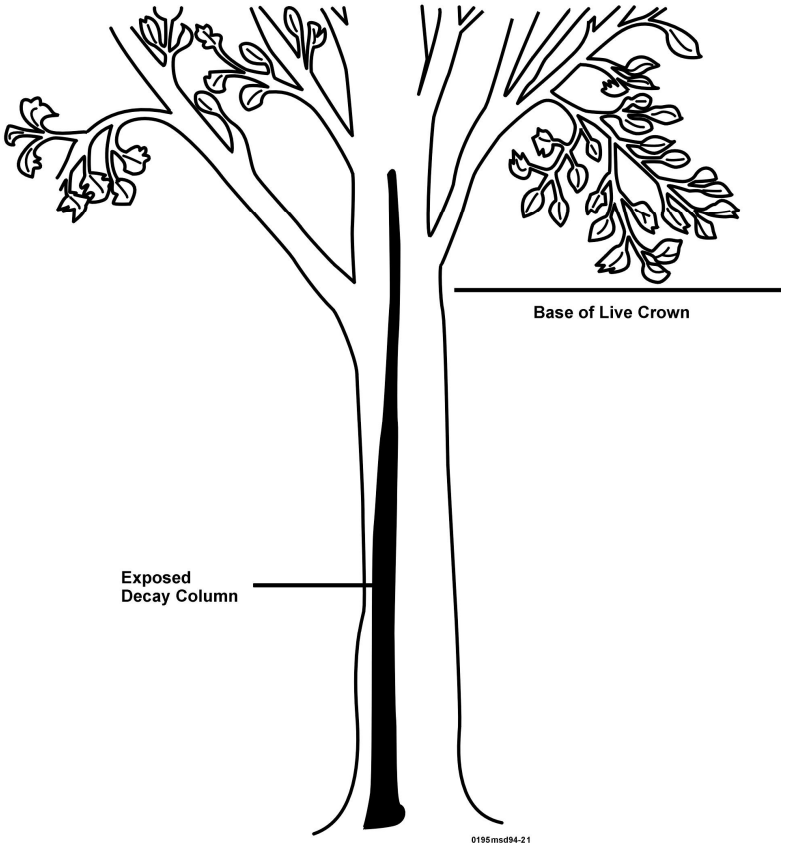


Figure 43. The damage runs from stump to crownstem. Code here should be 02 (roots and "stump" and lower bole) which represents the lowest locations of this multi-location damage.

5.20.2 DAMAGE TYPE 1 (CORE OPTIONAL) **[DTyp1]**

Record the first damage type observed that meets the damage threshold definition in the lowest location. Damage categories are recorded based on the numeric order that denotes decreasing significance from damage 01 - 31.

When Collected: All tally trees where DAMAGE LOCATION 1 > 0 **(CARIBBEAN Only)**
Field width: 2 digits
Tolerance: No errors
MQO: At least 80% of the time
Values:

1 Canker, gall: Cankers may be caused by various agents but are most often caused by fungi. The bark and cambium are killed, and this is followed by death of the underlying wood, although the causal agent may or may not penetrate the wood. This results in areas of dead tissue that become deeper and wider, or galling (including galls caused by rusts), on roots, bole, or branches. Due to the difficulty in distinguishing some abnormal swellings (e.g., burls) from classic galls and cankers, all are recorded as damage 01. A canker may be:

Annual (enlarges only once and does so within an interval briefer than the growth cycle of the tree, usually less than one year),

Diffuse (enlarges without characteristic shape or noticeable callus formation at margins), or

Perennial (enlarges during more than one year - often has a target appearance).

2 Conks, fruiting bodies, and signs of advanced decay: Fruiting bodies on the main bole, crownstem, and at the point of the branch attachment are signs of decay. "Punky wood" is a sign of decay and is evidenced by soft, often moist, and degraded tissue.

Cavities into the main bole that are oriented in such a way that they act as catchment basins for water are signs of decay. Bird cavities are signs of decay.

*Rotten branches or branches with conks **are not indicators of decay unless** the threshold is met (>20% of branches are affected).*

Rotting stumps associated with coppice regeneration (e.g., northern pin oak, maple) are excluded from coding.

3 Open wounds: An opening or series of openings where bark has been removed or the inner wood has been exposed and no signs of advanced decay are present. Improper pruning wounds that cut into the wood of the main stem are coded as open wounds, if they meet the threshold; those which leave the main stemwood intact are excluded.

4 Resinosis or gummosis: The origin of areas of resin or gum (sap) exudation on branches and trunks.

5 Cracks and seams: Cracks in trees are separations along the radial plane greater than or equal to 5 feet. When they break out to the surface they often are called frost cracks. These cracks are not caused by frost or freezing temperature, though frost can be a major factor in their continued development. Cracks are most often caused by basal wounds or sprout stubs, and expand when temperatures drop rapidly. Seams develop as the tree attempts to seal the crack, although trees have no mechanism to compartmentalize this injury.

Lightning strikes are recorded as cracks when they do not meet the threshold for open wounds.

11 Broken bole or roots (less than 3 feet from bole): Broken roots within 3 feet from bole either from excavation or rootsprung for any reason. For example, those which have been excavated in a road cut or by animals.

Stem broken in the bole area (below the base of the live crown) and tree is still alive.

12 Brooms on roots or bole: Clustering of foliage about a common point on the trunk. Examples include ash yellows witches' brooms on white and green ash and eastern and western conifers infected with dwarf mistletoes.

13 Broken or dead roots (beyond 3 feet): Roots beyond 3 feet from bole that are broken or dead.

20 Vines in the crown: Kudzu, grapevine, ivy, dodder, etc. smothers tree crowns. Vines are rated as a percentage of tree crown affected.

21 Loss of apical dominance, dead terminal: Mortality of the terminal of the crownstem caused by frost, insect, pathogen, or other causes.

22 Broken or dead: Branches that are broken or dead. Branches with no twigs are ignored and not coded as dead. Dead or broken branches attached to the bole or crownstem outside the live crown area are not coded. 20% of the main, first order portion of a branch must be broken for a branch to be coded as such. For woodland species only: Since dead branches often originate below the 12 in stump height and must be measured for DRC, there is no requirement that damage to branches can only occur to branches that originate within the live crown area.

23 Excessive branching or brooms within the live crown area: Brooms are a dense clustering of twigs or branches arising from a common point that occur within the live crown area. Includes abnormal clustering of vegetative structures and organs. This includes witches' brooms caused by ash yellows on green and white ash and those caused by dwarf mistletoes.

24 Damaged buds, foliage or shoots: Insect feeding, shredded or distorted foliage, buds or shoots >50% affected, on at least 30% of foliage, buds or shoots. Also includes herbicide or frost-damaged foliage, buds or shoots.

25 Discoloration of foliage: At least 30% of the foliage is more than 50% affected. Affected foliage must be more of some color other than green. If the observer is unsure if the color is green, it is considered green and not discolored.

31 Other: Use when no other explanation is appropriate. Specify in the tree notes section. Code 31 is used to maintain consistency with the Phase 3 crown damage protocols.

Legal Combinations of DAMAGE TYPE by DAMAGE LOCATION:

For each of the following location codes, possible damage codes and damage definitions are presented. Minimum damage thresholds are described in Section 5.20.3, DAMAGE SEVERITY.

Location 1: Roots and stump

01	Canker, gall -- exceeds 20% of circumference of stump
02	Conks, fruiting bodies, and signs of advanced decay -- any occurrence
03	Open wounds -- exceeds 20% of circumference of stump
04	Resinosis or gummosis -- origin of flow width exceeds 20% of circumference of stump
05	Cracks and seams -- any occurrence
11	Broken bole or roots less than 3 feet from bole -- any occurrence
12	Brooms on roots or bole -- any occurrence.
13	Broken or dead roots -- exceeds 20% of roots, beyond 3 feet from bole, broken or dead
31	Other

Location 2: Roots, stump, and lower bole

01	Canker, gall -- exceeds 20% of circumference of stump
02	Conks, fruiting bodies, and signs of advanced decay -- any occurrence
03	Open wounds – exceeds 20% at the point of occurrence, or for the portion in root zone, 20% of the circumference of stump
04	Resinosis or gummosis -- origin of flow width exceeds 20% at the point of occurrence, or for the portion in root zone, 20% of circumference of stump.
05	Cracks and seams - any occurrence
11	Broken bole or roots less than 3 feet from bole -- any occurrence
12	Brooms on roots or bole - -any occurrence.
13	Broken or dead roots -- exceeds 20% of roots, beyond 3 feet from bole, broken or dead
31	Other

Location 3: Lower bole

- 01 Canker, gall -- exceeds 20% of circumference at the point of occurrence
- 02 Conks, fruiting bodies, and signs of advanced decay -- any occurrence
- 03 Open wounds -- exceeds 20% of circumference at the point of occurrence
- 04 Resinosis or gummosis -- origin of flow width exceeds 20% of circumference at the point of occurrence
- 05 Cracks and seams -- any occurrence
- 11 Broken bole or roots less than 3 feet from bole -- any occurrence
- 12 Brooms on roots or bole -- any occurrence
- 31 Other

Location 4: Lower and upper bole -- same as lower bole.

Location 5: Upper bole - same as lower bole.

Location 6: Crownstem

- 01 Canker, gall -- exceeds 20% of circumference of crownstem at the point of occurrence
- 02 Conks, fruiting bodies, and signs of advanced decay -- any occurrence
- 03 Open wounds - exceeds 20% of circumference at the point of occurrence -- any occurrence
- 04 Resinosis or gummosis -- origin of flow width exceeds 20% of circumference at the point of occurrence
- 05 Cracks and seams -- all woody locations -- any occurrence.
- 21 Loss of apical dominance, dead terminal -- any occurence
- 31 Other

Location 7: Branches >1 in at the point of attachment to the main or crown stem

- 01 Canker, gall -- exceeds 20% of circumference on at least 20% of branches
- 02 Conks, fruiting bodies and signs of advanced decay -- more than 20% of branches affected
- 03 Open wounds -- exceeds 20% of circumference at the point of occurrence on at least 20% of branches
- 04 Resinosis or gummosis -- origin of flow width exceeds 20% of circumference at the point of occurrence on at least 20% of branches
- 05 Cracks and seams -- all occurrences, and on at least 20% of branches
- 20 Vines in the crown -- more than 20% of live crown affected
- 22 Broken or dead -- more than 20% of branches affected within the live crown area, except for woodland species where there is no requirement that damage to branches can only occur to branches that originate within the live crown area.
- 23 Excessive branching or brooms -- more than 20% of branches affected
- 31 Other

Location 8: Buds and shoots

- 24 Damaged buds, shoots or foliage - more than 30% of buds and shoots damaged more than 50%.
- 31 Other.

Location 9: Foliage

- 24 Damaged buds, shoots or foliage - more than 30% of foliage damaged more than 50%.
- 25 Discoloration of foliage - more than 30% of foliage discolored more than 50%.
- 31 Other.

5.20.3 DAMAGE SEVERITY 1 (CORE OPTIONAL) **[DSev1]**

Record a code to indicate the amount of affected area (above threshold) in DAMAGE LOCATION 1 recorded for TREE DAMAGE 1. Severity codes vary depending on the type of damage recorded.

When Collected: All tally trees where DAMAGE LOCATION 1 > 0 **(CARIBBEAN Only)**
Field width: 1 digit
Tolerance: +/- 1 valid class unless otherwise defined by the DAMAGE TYPE
MQO: At least 80% of the time
Values: The codes and procedures for SEVERITY 1 values are defined for each DAMAGE TYPE 1.

DAMAGE TYPE Code 01 -- Canker, gall

Measure the affected area from the margins (outer edges) of the canker or gall within any 3-foot vertical section in which at least 20% of circumference is affected at the point of occurrence. For location 7, and location 1, 20% of branches and roots beyond 3 feet, respectively, must be affected, then record in 10% classes. See Figure 44.

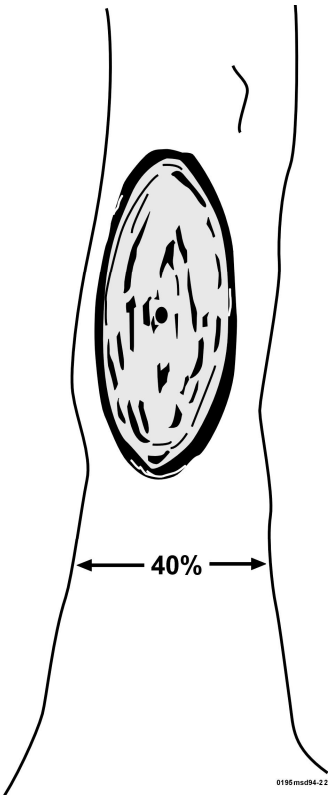


Figure 44. A canker which exceeds threshold. Since 40% of circumference is visible from any side, and since over half the visible side is taken up by the canker, it obviously exceeds the 20% minimum circumference threshold.

Severity classes for code 01 (percent of circumference affected):

Classes	Code
20-29	2
30-39	3
40-49	4
50-59	5
60-69	6
70-79	7
80-89	8
90-99	9

DAMAGE TYPE Code 02 -- Conks, fruiting bodies, and signs of advanced decay

Severity classes for code 02: **None**. Enter code 0 regardless of severity, except for roots > 3 feet from the bole, or number of branches affected - 20%

DAMAGE TYPE Code 03 -- Open wounds

The damaged area is measured at the widest point between the margins of the exposed wood within any 3-foot vertical section in which at least 20% of the circumference is affected at the point of occurrence. For location 7 and location 1, 20% of branches and roots beyond 3 feet, respectively, must be affected. Then record in 10% classes. See Figure 45.

Severity Classes for code 03 (percent of circumference affected):

Classes	Code
20-29	2
30-39	3
40-49	4
50-59	5
60-69	6
70-79	7
80-89	8
90-99	9

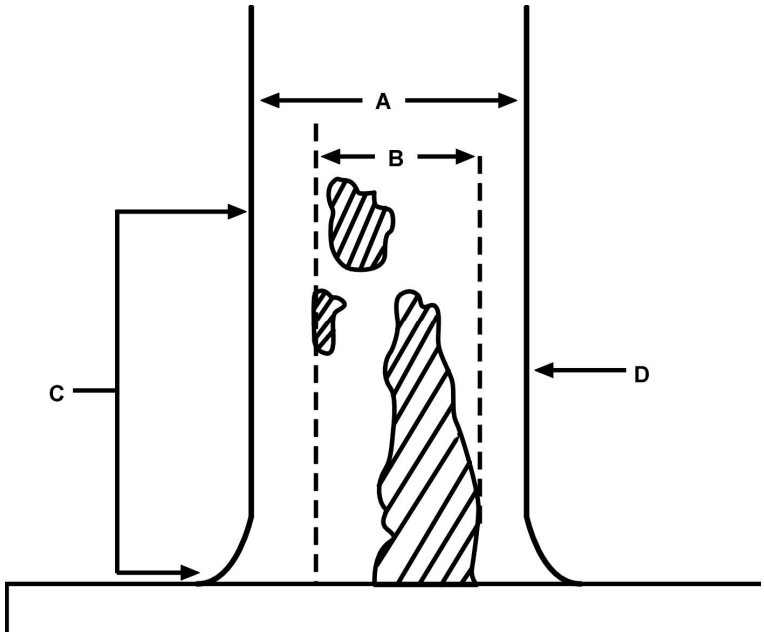


Figure 45. Multiple damage in "stump" and lower bole. A=approximately 40% of tree circumference; B=portion of tree circumference affected by damage; C=vertical distance within one meter; D=midpoint of occurrence at which circumference is measured.

DAMAGE TYPE Code 04 -- Resinosis or gummosis

Resinosis or gummosis is measured at the widest point of the origin of the flow width in which at least 20% of the circumference is affected at the point of occurrence. For location 7 and location 1, 20% of branches and roots beyond 3 feet, respectively, must be affected. Then record in 10% classes.

Severity classes for code 04 (percent of circumference affected):

Classes	Code
20-29	2
30-39	3
40-49	4
50-59	5
60-69	6
70-79	7
80-89	8
90-99	9

DAMAGE TYPE Code 05 -- Cracks and seams greater than or equal to 5 feet

Severity class for code 05 -- Record "0" for the lowest location in which the crack occurs. For location 7 and location 1, 20% of branches and roots beyond 3 feet, respectively, must be affected. Then record in 10% classes.

DAMAGE TYPE Code 11 -- Broken bole or roots less than 3 feet from bole

Severity classes for code 11: None. Enter code 0 regardless of severity.

DAMAGE TYPE Code 12 -- Brooms on roots or bole

Severity classes for code 12: None. Enter code 0 regardless of severity.

DAMAGE TYPE Code 13 -- Broken or dead roots

At least 20% of roots beyond 3 feet from bole that are broken or dead.

Severity classes for code 13 (percent of roots affected):

Classes	Code
20-29	2
30-39	3
40-49	4
50-59	5
60-69	6
70-79	7
80-89	8
90-99	9

DAMAGE TYPE Code 20 -- Vines in crown

Severity classes for code 20 (percent of live crown affected):

Classes	Code
20-29	2
30-39	3
40-49	4
50-59	5
60-69	6
70-79	7
80-89	8
90-99	9

DAMAGE TYPE Code 21 -- Loss of apical dominance, dead terminal

Any occurrence (> 1%) is recorded in 10% classes as a percent of the crownstem affected. Use trees of the same species and general DBH/DRC class in the area or look for the detached portion of the crownstem on the ground to aid in estimating percent affected. If a lateral branch has assumed the leader and is above where the previous terminal was, then no damage is recorded.

Severity classes for code 21:

Classes	Code
01-09	0
10-19	1
20-29	2
30-39	3
40-49	4
50-59	5
60-69	6
70-79	7
80-89	8
90-99	9

DAMAGE TYPE Code 22 -- Broken or dead branches (> 1 inch above the swelling at the point of attachment to the main or crown stem within the live crown area)

At least 20% of branches are broken or dead.

For woodland species, severity should be based on volume and not by % (or number of) branches affected. Calculate severity by taking the square of the diameter of each stem, summing them up, and recording the percent of total as the severity class.

Severity classes for code 22 (percent of branches affected):

Classes	Code
20-29	2
30-39	3
40-49	4
50-59	5
60-69	6
70-79	7
80-89	8
90-99	9

DAMAGE TYPE Code 23 -- Excessive branching or brooms

At least 20% of crownstem or branches affected with excessive branching or brooms.

Severity classes for code 23 (percent of area affected):

Classes	Code
20-29	2
30-39	3
40-49	4
50-59	5
60-69	6
70-79	7
80-89	8
90-99	9

DAMAGE TYPE Code 24 - Damaged buds, shoots or foliage

At least 30% of the buds, shoots or foliage (i.e., chewed or distorted) are more than 50% affected.

Severity classes for code 24:

Classes	Code
30-39	3
40-49	4
50-59	5
60-69	6
70-79	7
80-89	8
90-99	9

DAMAGE TYPE Code 25 - Discoloration of Foliage

At least 30% of the foliage is more than 50% affected.

Severity classes for code 25 (percent affected):

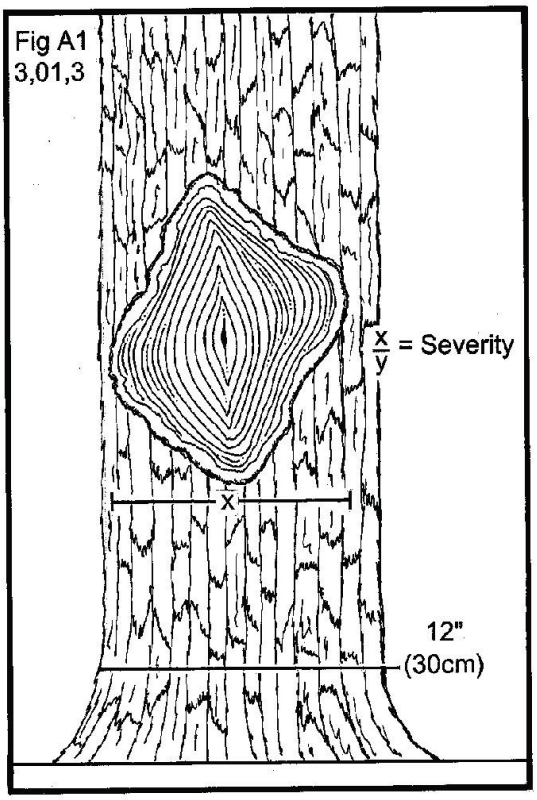
Classes	Code
30-39	3
40-49	4
50-59	5
60-69	6
70-79	7
80-89	8
90-99	9

DAMAGE TYPE Code 31 -- Other

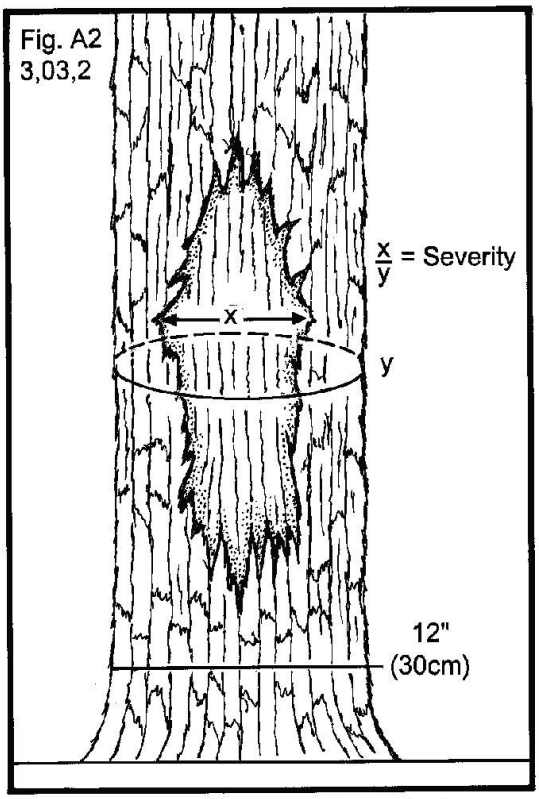
Severity classes for code 31:

None. Enter code 0 regardless of severity. Describe condition in tree notes.

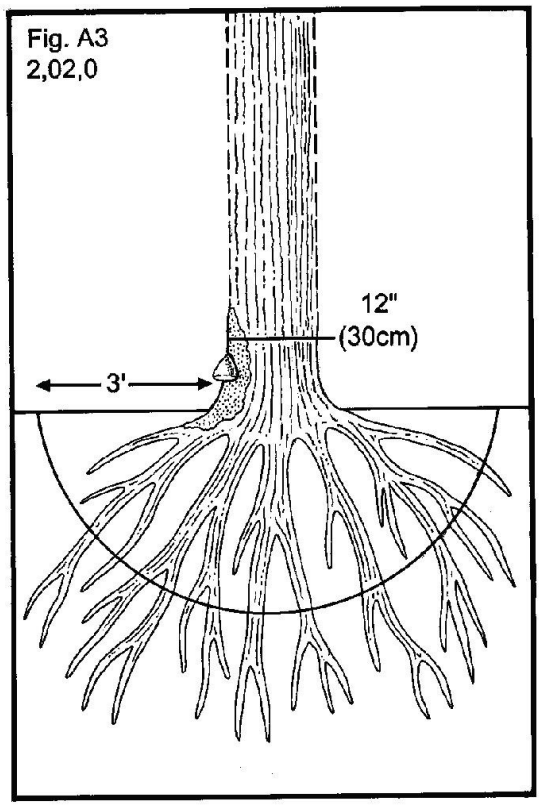
Examples are shown in Figures 46-52.



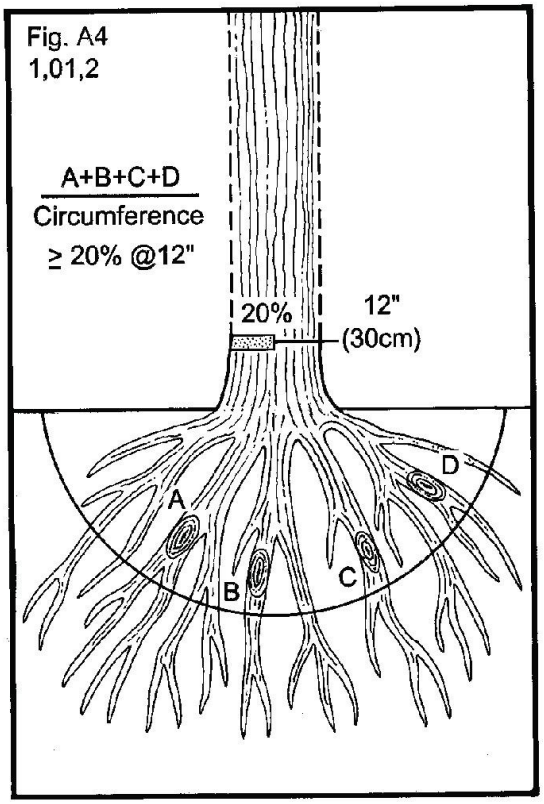
01 - Canker measured as widest distance between the outside of canker swelling (refer to Fig. 2 for y measurement)



03 - Open wound measured at widest point inside of wound margins

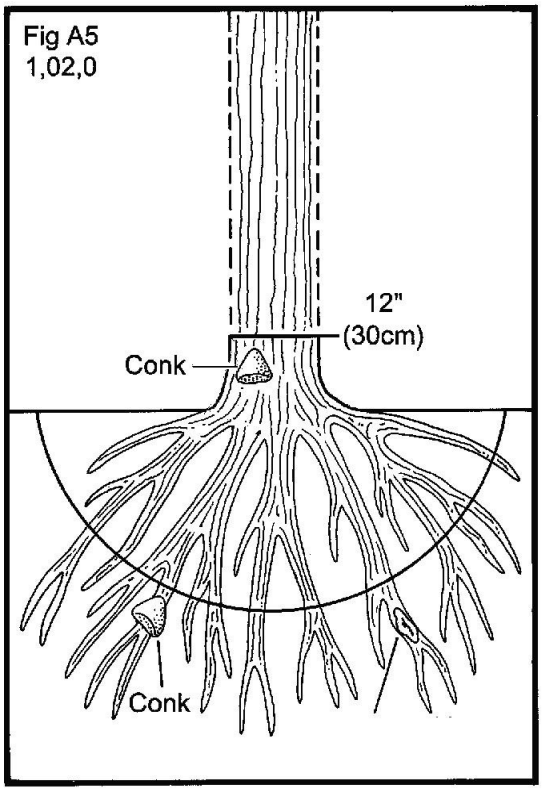


02 - Decay indicator on roots and lower bole

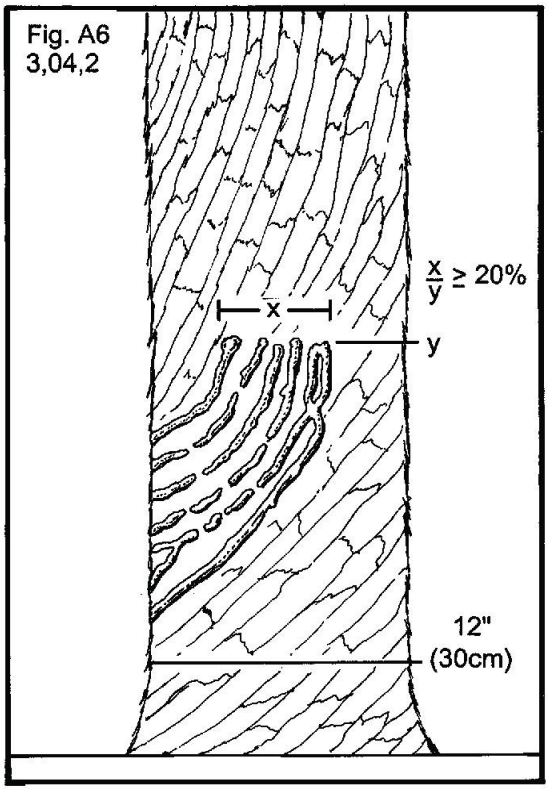


01 - Canker / gall on roots (within 3' of bole)

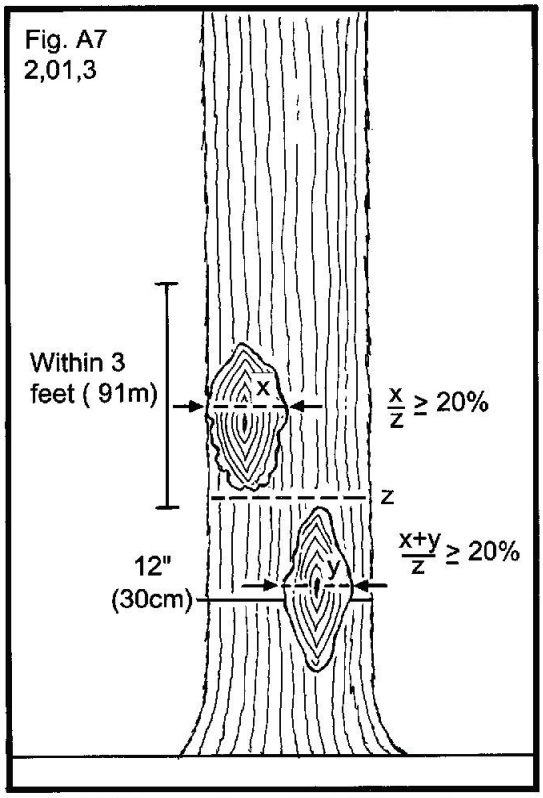
Figure 46. Examples of damage coding.



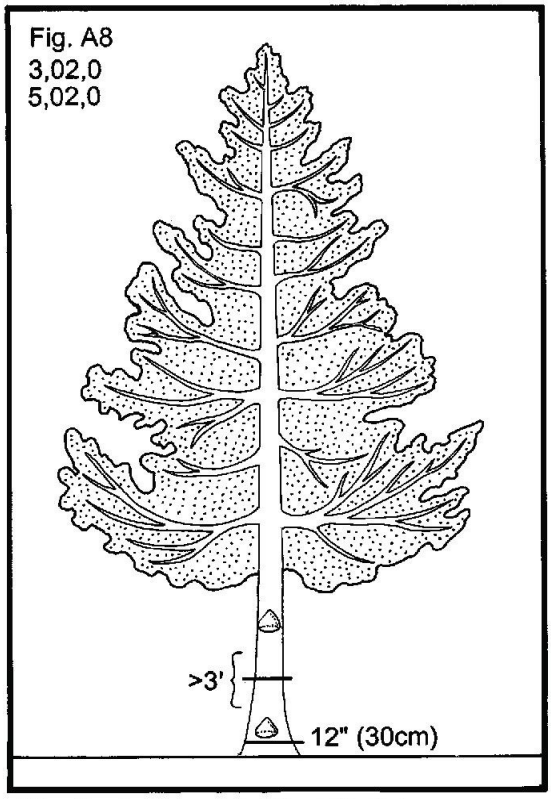
02 - Indicator of decay within 3' of bole. Beyond 3" of bole, indicators must affect ≥ 20% of roots (see fig. 12)



04 - Origin of resinosis in lower bole

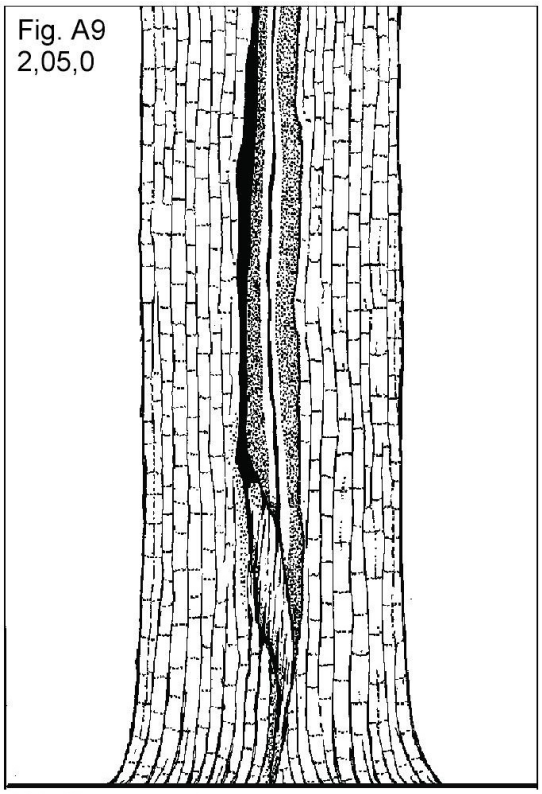


01 - Additive cankers within 3' in roots and lower bole

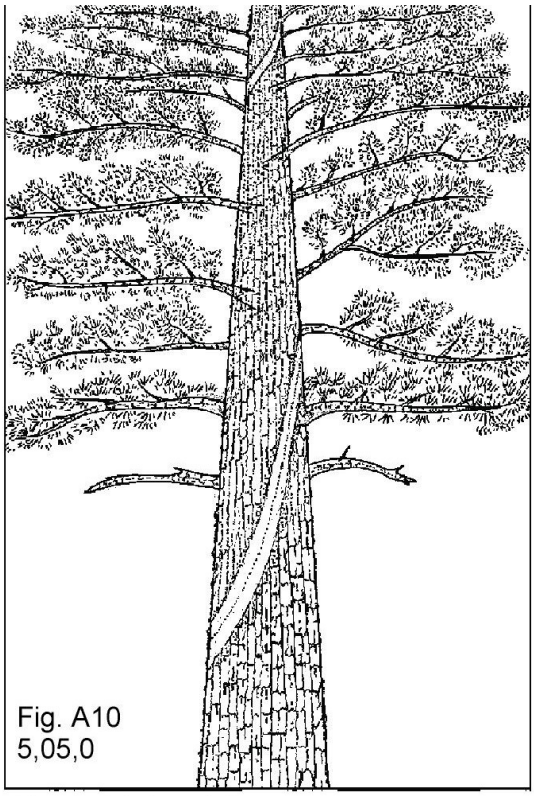


02 - Conks separated by >3'; 2 damages

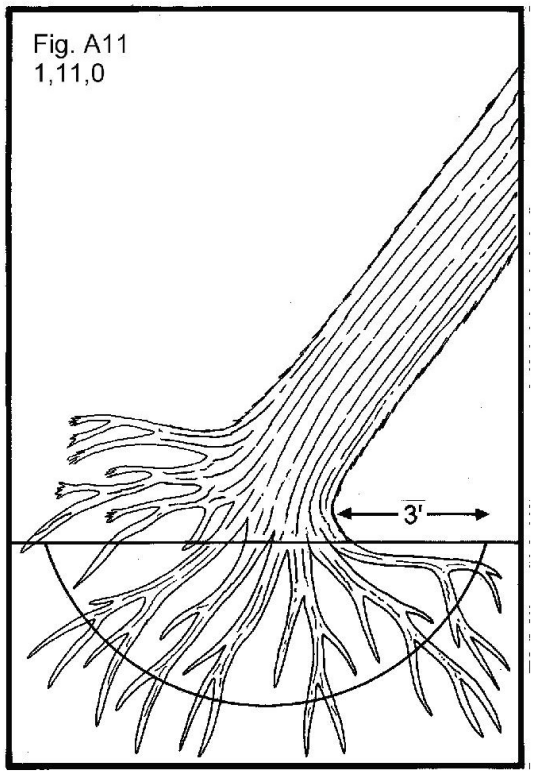
Figure 47. Examples of damage coding.



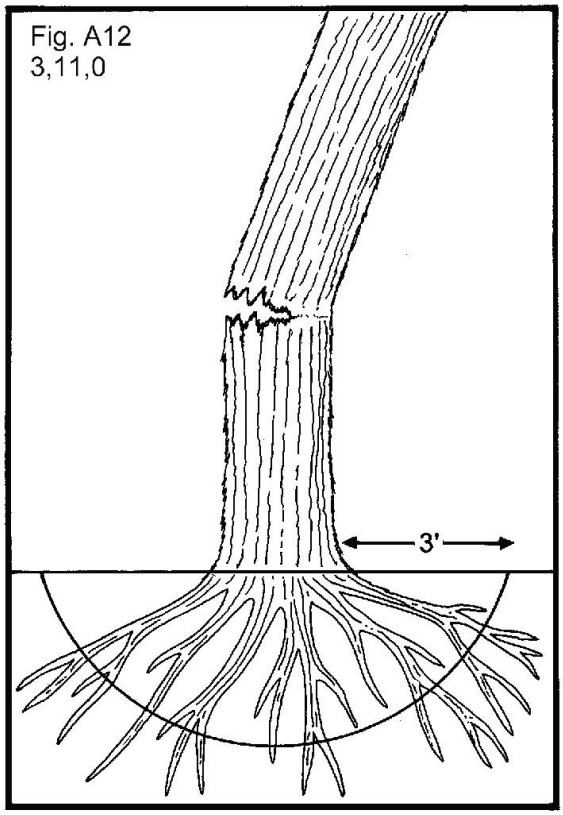
05- Cracks and seams



05 - Lightning strike

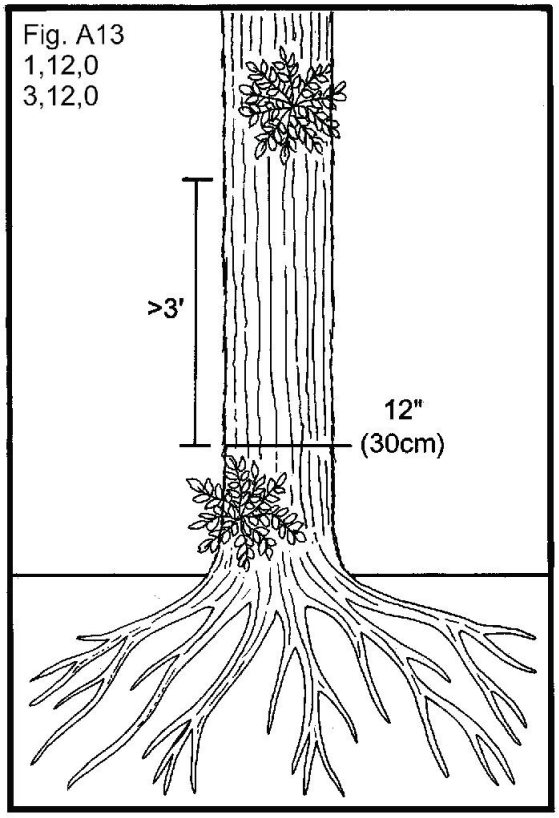


11 - Broken bole or roots <3' from bole, broken roots must be visible

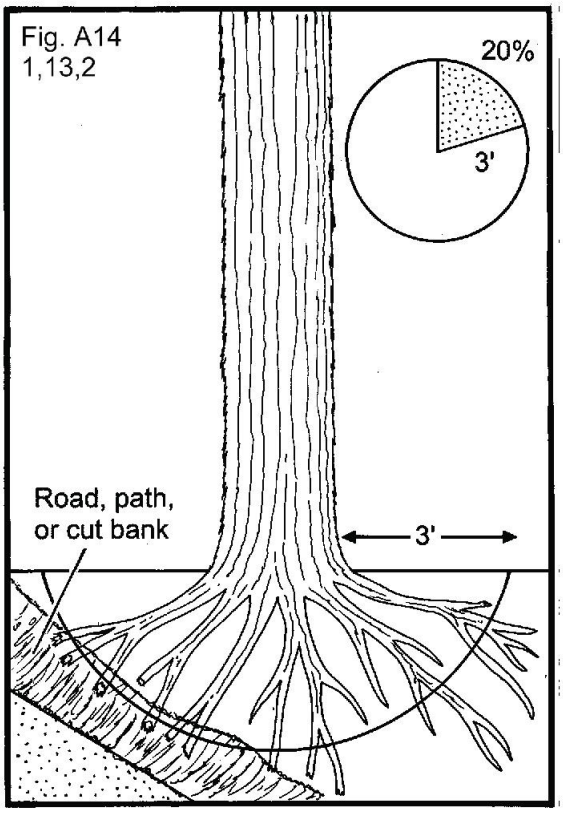


11 - Broken bole or roots <3' from bole

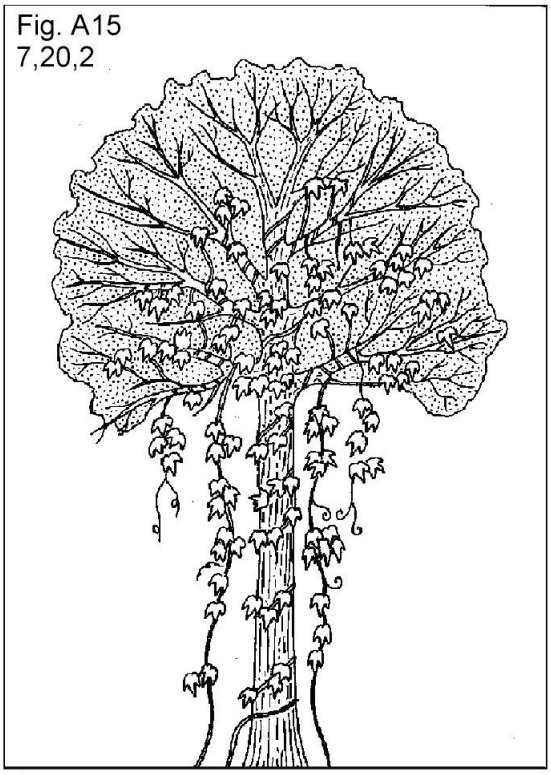
Figure 48. Examples of damage coding.



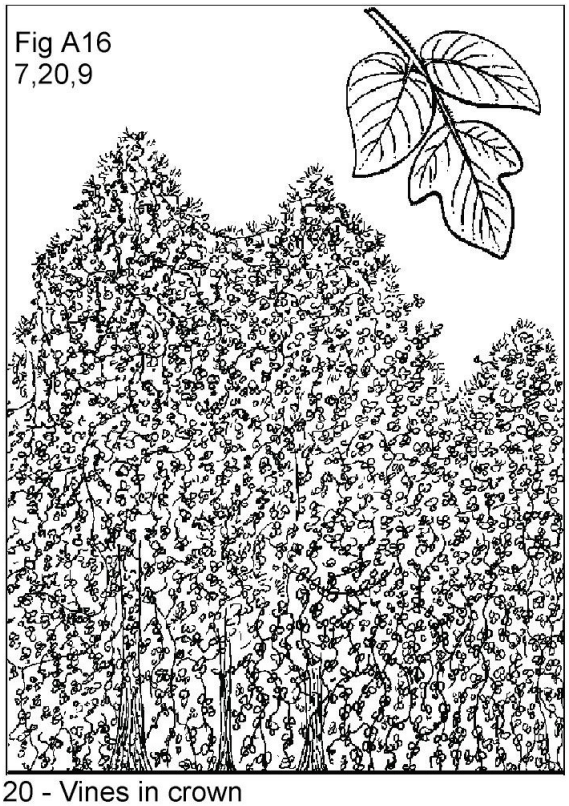
12 - Brooms on roots or bole



13 - Broken or dead roots >3' from bole

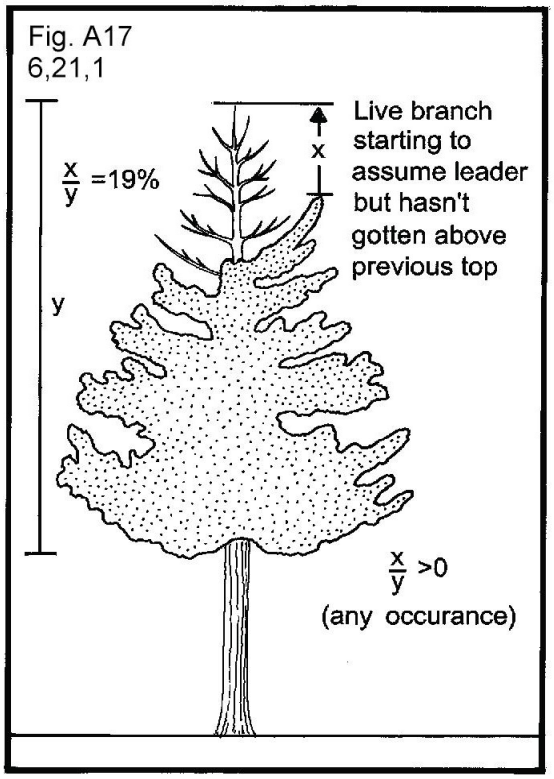


20 - Vines in crown

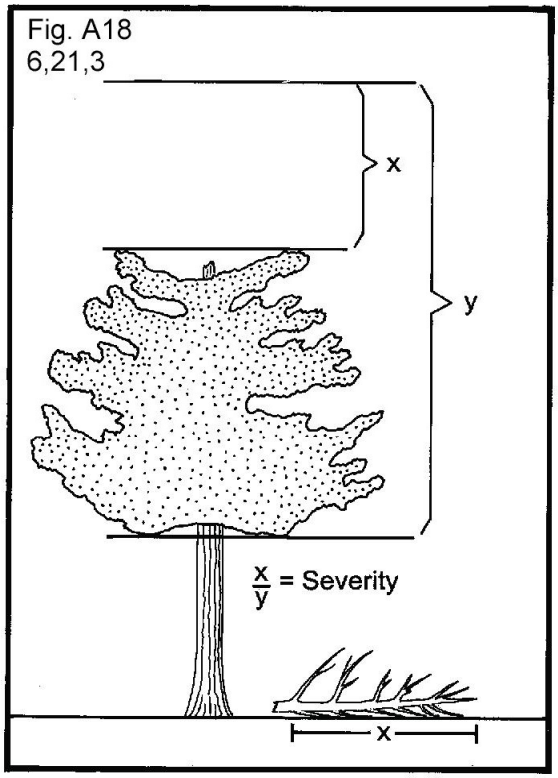


20 - Vines in crown

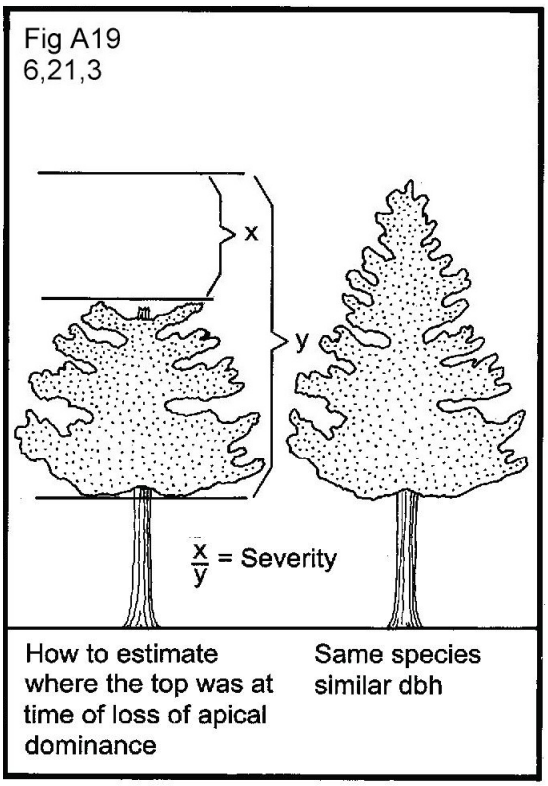
Figure 49. Examples of damage coding.



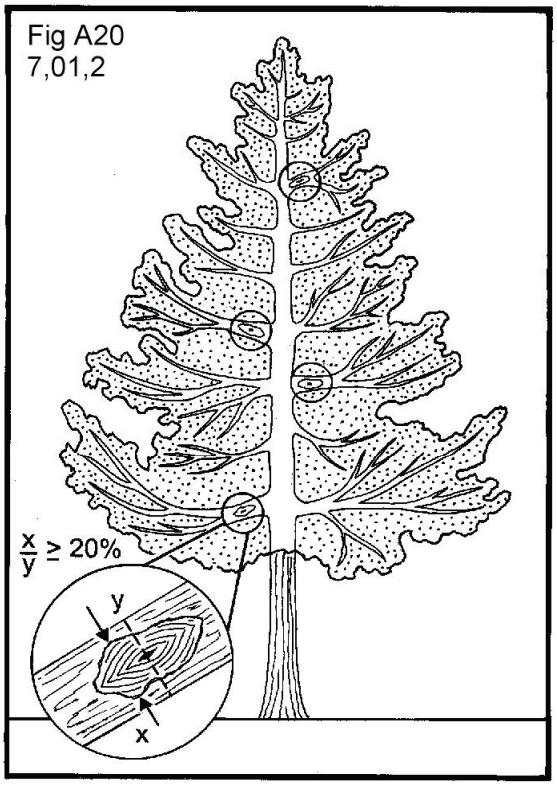
21 - Loss of apical dominance



21 - Loss of apical dominance, look for old top to estimate the top of x and y

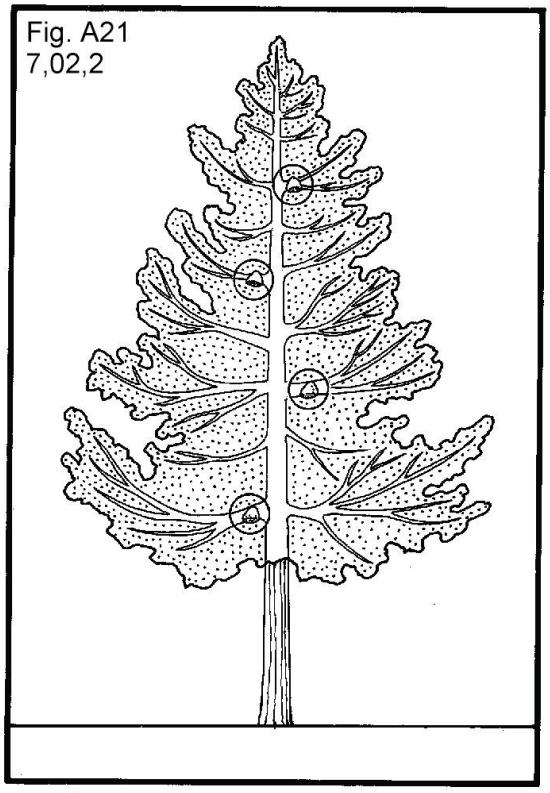


21 - Loss of apical dominance, look for same species of similar dbh

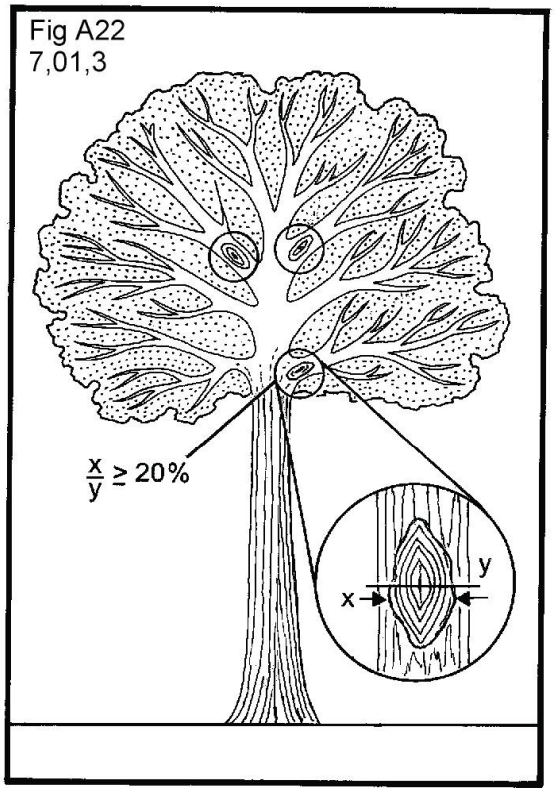


01 - Cankers above the threshold on ≥ 20% of branches

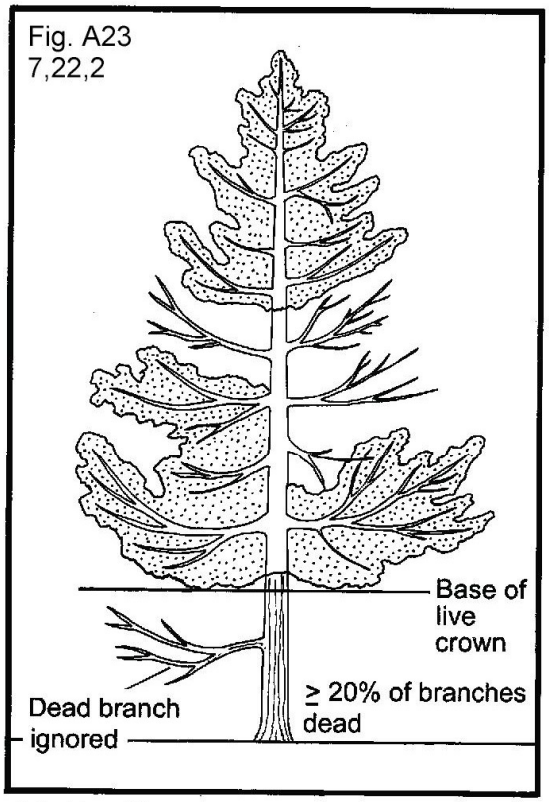
Figure 50. Examples of damage coding.



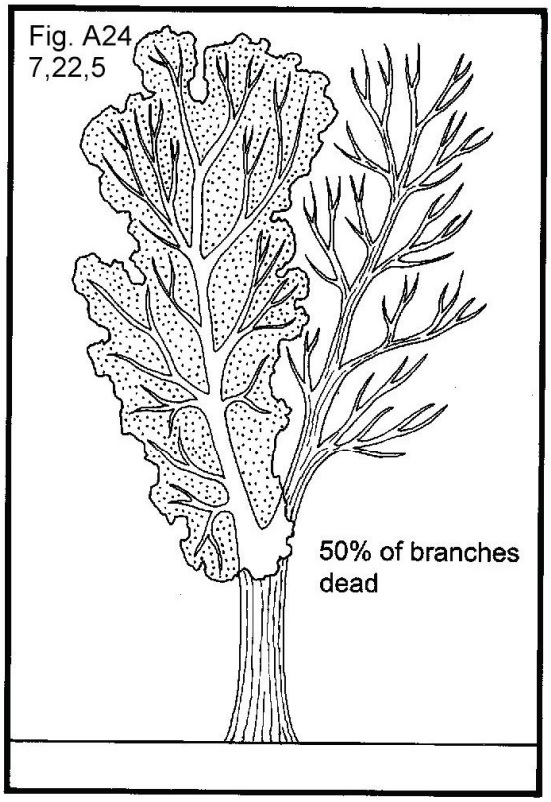
02 - Conks on ≥ 20% of branches



01 - Cankers above threshold on ≥ 20% of branches

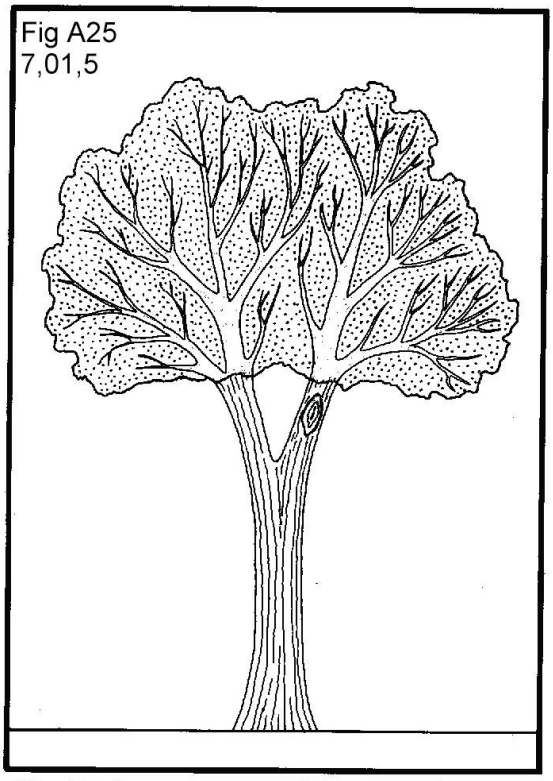


22 - Dead branches within the live crown area. If branches cannot easily be counted, estimate % area of live crown affected

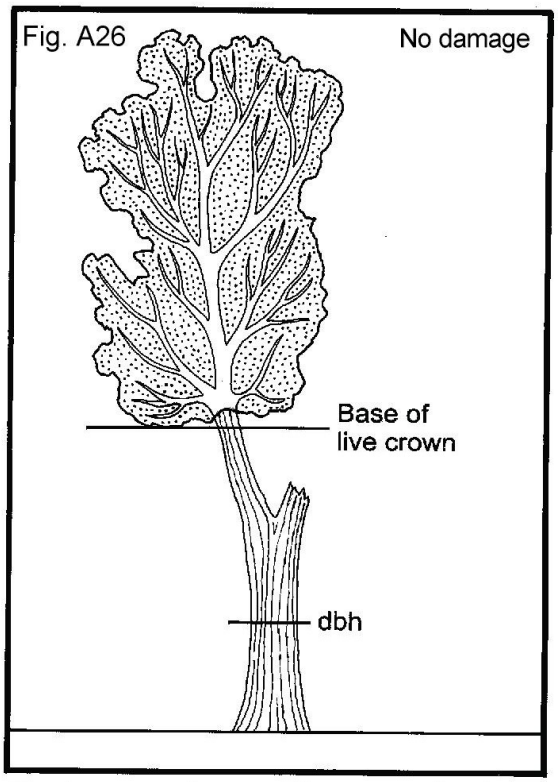


22 - Dead branches; only 2 branches present within live crown area, fines present and ≥ 20% of branch dead

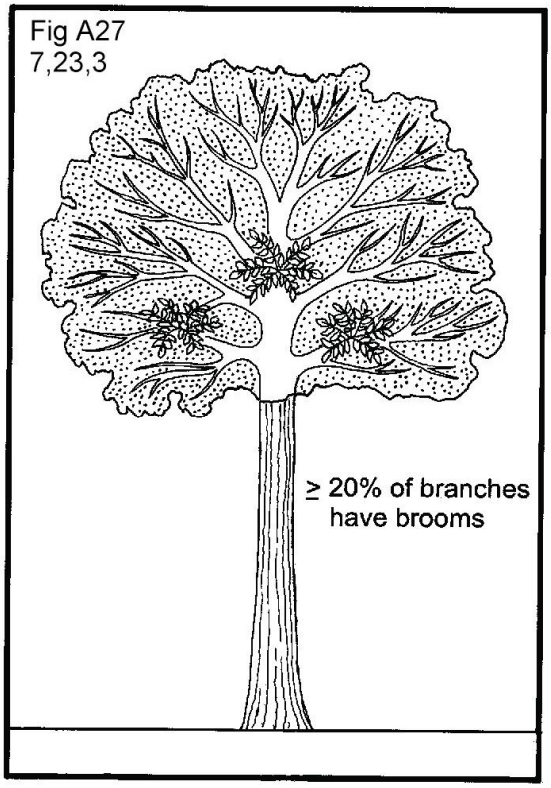
Figure 51. Examples of damage coding.



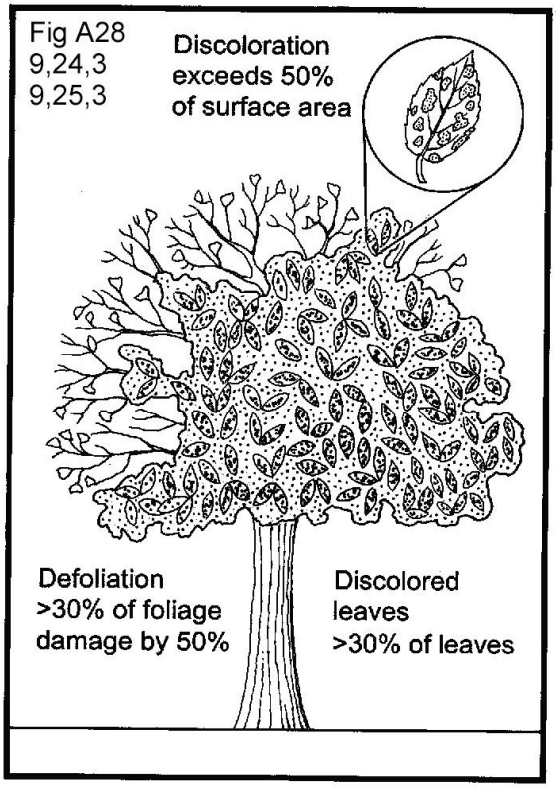
01 - Canker; no crown stem and only 2 branches present



No damage - base of live crown is above old fork, stub is a snag branch



23 - Excessive branching or brooms in crown



24 - Defoliation, 25 - Discoloration

Figure 52. Examples of damage coding.

Procedures to Record Multiple Occurrences of the Same Damage

Damage codes 01 (canker), 03 (open wounds), and 04 (resinosis/gummosis) must meet a threshold of 20 percent of the circumference at the point of occurrence, within any 3-foot section. Multiple cankers or open wounds which are directly above one another pose no more threat to long term tree survival than would a single damage incidence of the same width. However, should multiple damages be located horizontally within any 3-foot section, the translocation of water and nutrients would be significantly affected. The widths of each individual damage are added and compared as a percent to the total circumference at the midpoint of the 3-foot section (Figure 45).

Procedures to Measure Circumference Affected

A practical approach is to observe every face of the "stump", bole, or crownstem. About 40 percent of the circumference of a face can be observed at any one time. The damage is measured horizontally between the margins. If the cumulative area affected within a 3-foot section exceeds 1/2 of any face, then the 20 percent minimum threshold has been met. The percent of the circumference affected by damage is then estimated in 10 percent classes. If in doubt, measure the damage and circumference at the widest point of occurrence on the bole with a linear tape, and determine the percent affected.

5.20.4 DAMAGE LOCATION 2 (CORE OPTIONAL) **[DLoc2]**
Record the location on the tree where TREE DAMAGE 2 is found. Follow the same procedures as for DAMAGE LOCATION 1.

5.20.5 DAMAGE TYPE 2 (CORE OPTIONAL) **[DTyp2]**
Record the second damage type observed that meets the damage threshold definition in the lowest location. Follow the same procedures as for DAMAGE TYPE 1.

5.20.6 DAMAGE SEVERITY 2 (CORE OPTIONAL) **[DSev2]**
Record the amount of affected area (above threshold) in DAMAGE LOCATION 2 recorded for DAMAGE TYPE 2. Follow the same procedures as for DAMAGE SEVERITY 1.

SRS Note to Users: If damages are not collected in your state, these pages may be removed from your copy of the field guide.

5.21 CAUSE OF DEATH **[Cause]**
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. If it can be determined, the cause of death recorded is the initial agent of the tree's decline and eventual mortality.

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) **[MorYr]**

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.

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 **[Decay]**

Record the decay class for each standing dead tally tree, 5.0 inches in diameter and larger, the code indicating the tree's stage of decay. The stage of decay will vary between species based on the properties of the wood, the site conditions and climate.

When Collected: All standing dead tally trees ≥ 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:

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) **[LDiam]**
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) ≥ 1.0 in DBH when PRESENT DIAMETER > 0
Field width: 3 digits
Tolerance: +/- 0.2 ft
MQO: At least 90% of the time
Values: 1.00 – 15.0

SRS Note: Diameter measurement points that exceed 15.0 feet require a TREE NOTE recording the LENGTH TO MEASUREMENT POINT applied for the collected diameter.

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 ≥ 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 ≥ 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 **[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 **[TrCls]**

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

This code represents a classification of the overall quality of the tree that is ≥ 5 inches in diameter. It classifies the quality of a live sawtimber tree based on the present condition. It also forecasts the potential quality of a live poletimber tree when it becomes sawtimber size. The goal of the tree classification system is basically a check of the straightness and soundness of sawlog length or the potential sawlog length of poletimber-size trees. A small diameter poletimber-size tree should be allowed more leeway due to the possibilities of growing out of deformities.

Prior to assigning a tree class, it is necessary to determine the sawlog length and the amount of board-foot cull present within the sawlog length. When evaluating the sawlog length for tree class, the sawlog length is measured from a 1 foot stump to a 9.0-in top DOB for hardwoods or a 7.0-in top DOB for softwoods. For trees that fork, only use one stem when determining sawlog length (i.e., follow the stem yielding the most merchantable volume). See Figure 41a.

The following is a general rule to determine the future DOB sawlength top on a poletimber-size tree. (The rule assumes that a tree's diameter increases uniformly along its bole and should not be applied to trees that fork.) To apply the rule, take the current diameter and subtract 2-inches. Determine where this new diameter exists on the current bole. The point on the bole where this lesser diameter occurs is the predicted top DOB when the tree becomes sawtimber-size. Example, a tree has a current DBH of 7.5-in. Find the current point on the bole that is currently 5.5-in DOB. The length from a 1 ft stump to this point is the estimated top DOB of the saw log length once the tree becomes sawtimber size. Is there 12 ft or more of length? If yes, then tree can potentially be a Tree Class 2 as long as it will potentially have 1/3 merchantable board full volume. See Figure 41b.

On naturally swelled-butted trees (e.g., baldcypress, pondcypress, water tupelo, swamp tupelo, Carolina ash), TREE CLASS is determined 3.5 feet below the recorded LENGTH TO DIAMETER MEASUREMENT POINT. This point is the base of the butt log. See TOTAL LENGTH for illustration.

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.

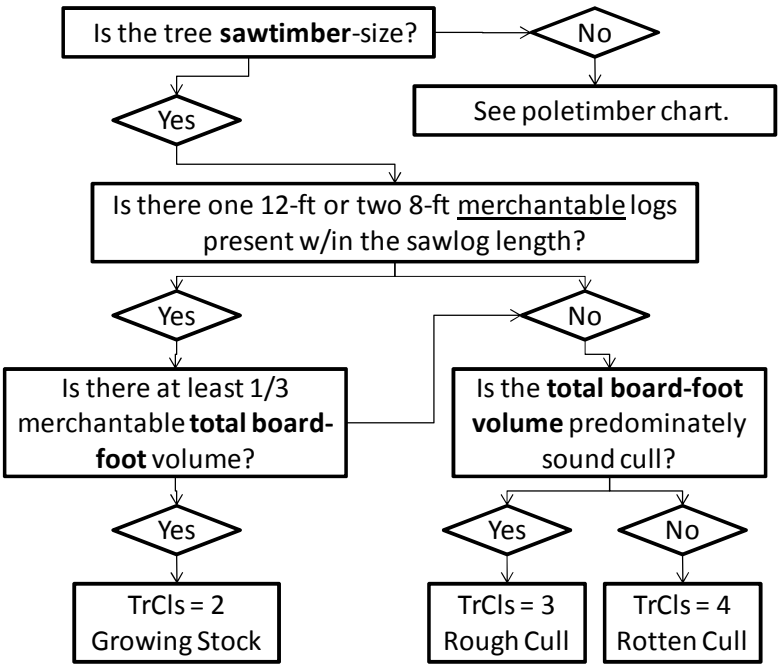


Figure 41a. Sawtimber-size TREE CLASS flow chart.

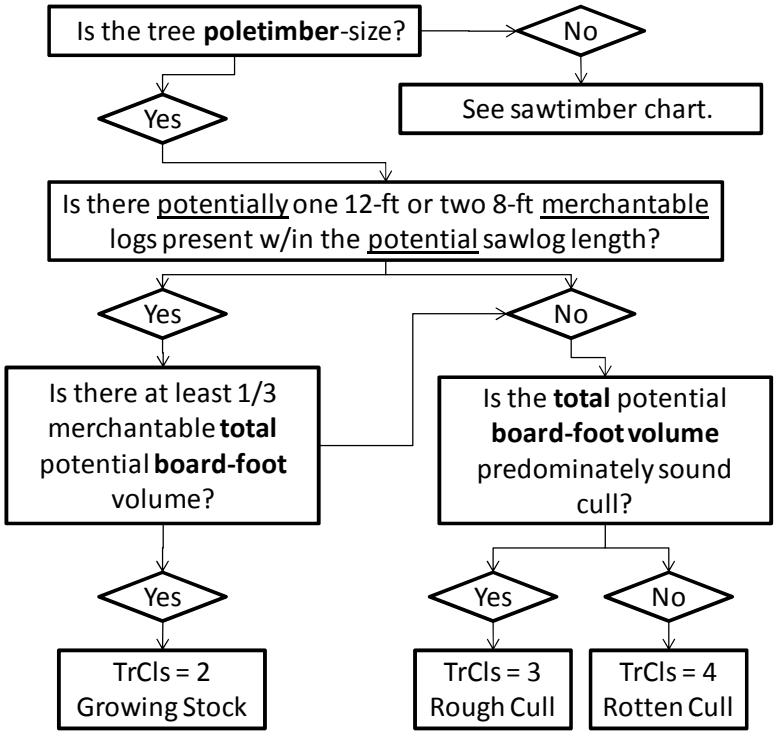


Figure 41b. Poletimber-size TREE CLASS flow chart.

5.29 SRS TREE GRADE **[Grade]**

Record the code indicating the grade of the tree. See Supplement A for full description of procedures.

On naturally swelled-butted trees (e.g., baldcypress, pondcypress, water tupelo, swamp tupelo, Carolina ash), TREE GRADE is determined 3.5 feet below the recorded LENGTH TO DIAMETER MEASUREMENT POINT. This point is the base of the butt log. See TOTAL LENGTH for illustration.

This variable is not collected in WTX.

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

Note: In Caribbean, gradable trees will always be assigned grade '5'.

5.30 SRS PERCENT BOARD FOOT CULL **[%BdFt]**

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.

On naturally swelled-butted trees (e.g., baldcypress, pondcypress, water tupelo, swamp tupelo, Carolina ash) cull is determined 3.5 feet below the recorded LENGTH TO DIAMETER MEASUREMENT POINT. This point is the base of the butt log. No cull is assessed below this point. See TOTAL LENGTH for illustration.

This variable is not collected in WTX.

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 **[Dis]**

Record the incidence of fusiform, comandra rust and dieback.

This variable is not collected in WTX.

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

Code	Agent	Description/Threshold
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 (CROWN CLASS 5). 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 **[%Die]**

Record the severity of hardwood crown dieback. This mortality of branches with fine twigs. Dieback is only considered when it occurs in the upper and outer portions of the tree.

This variable is not collected in WTX.

When collected: HARDWOOD Dieback Incidence = 2
Field width: 1 digit
Tolerance: +/- 1 class
MQO: At least 80% of the time
Values: 1 to 9

Code	Class in percent	Code	Class in percent	Code	Class in percent
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 **[Util]**

Record the code to identify the utilization class of removal trees.

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 **[SpSRS]**

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 **[AbTer]**

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

5.36 SRS CARIBBEAN SPECIES **[Spp]**

Record the appropriate SRS CARIBBEAN SPECIES code from list in APPENDIX 3. Use codes that are designated for the Caribbean (C) from both the national list and the supplemental Caribbean list.

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

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 **[SBPLT]**

Use the same procedures described in Section 3.1.

When Collected: All counts of seedlings

6.2 SPECIES **[SPP]**

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 **[Cond#]**

Use the same procedures described in Section 2.0.

When Collected: All counts of seedlings

6.4 SEEDLING COUNT **[SCnt]**

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. No additional suckers or sprouts are counted. 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.

SRS Note: Site trees are required for all delineated forest conditions when available.

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. If a plot has been cut and all suitable site trees have been removed, a site tree may be obtained from an adjacent stand that is similar in site characteristics: forest type, stand origin, physiographic class, slope and aspect.

7.2 SITE TREE DATA VARIABLES

7.2.1 CONDITION CLASS LIST **[CList]**

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 [SPP]

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 **[Diam]**
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 **[Leng]**
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 **[TrAge]**
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 **[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) **[Sub#]**
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) **[Azi]**
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 3607.

2.9 HORIZONTAL DISTANCE (CORE OPTIONAL) **[Dist]**
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 **[SCla]**
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 and REGIONAL SUPPLEMENTS

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

A. Cull and Tree Grading Procedures, Charts and Tables

B. Miscellaneous Tables

C. *Under Construction*

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

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


Lauderdale
Limestone
Madison
Jackson
Colbert
Franklin
Lawrence
Morgan
Marshall
De Kalb
Marion
Winston
Cullman
Cherokee
Etowah
Blount
Lamar
Fayette
Walker
St Clair
Calhoun
Jefferson
Cleburne
Talladega
Pickens
Tuscaloosa
Shelby
Clay
Randolph
Bibbs
Greene
Coosa
Tallapoosa
Chambers
Chilton
Hale
Perry
Elmore
Lee
Autauga
Sumter
Macon
Montgomery
Dallas
Russell
Marengo
Lowndes
Choctaw
Bullock
Wilcox
Barbour
Butler
Pike
Clarke
Crenshaw
Monroe
Henry
Washington
Conecuh
Coffee
Dale
Covington
Escambia
Geneva
Houston
Mobile
Baldwin

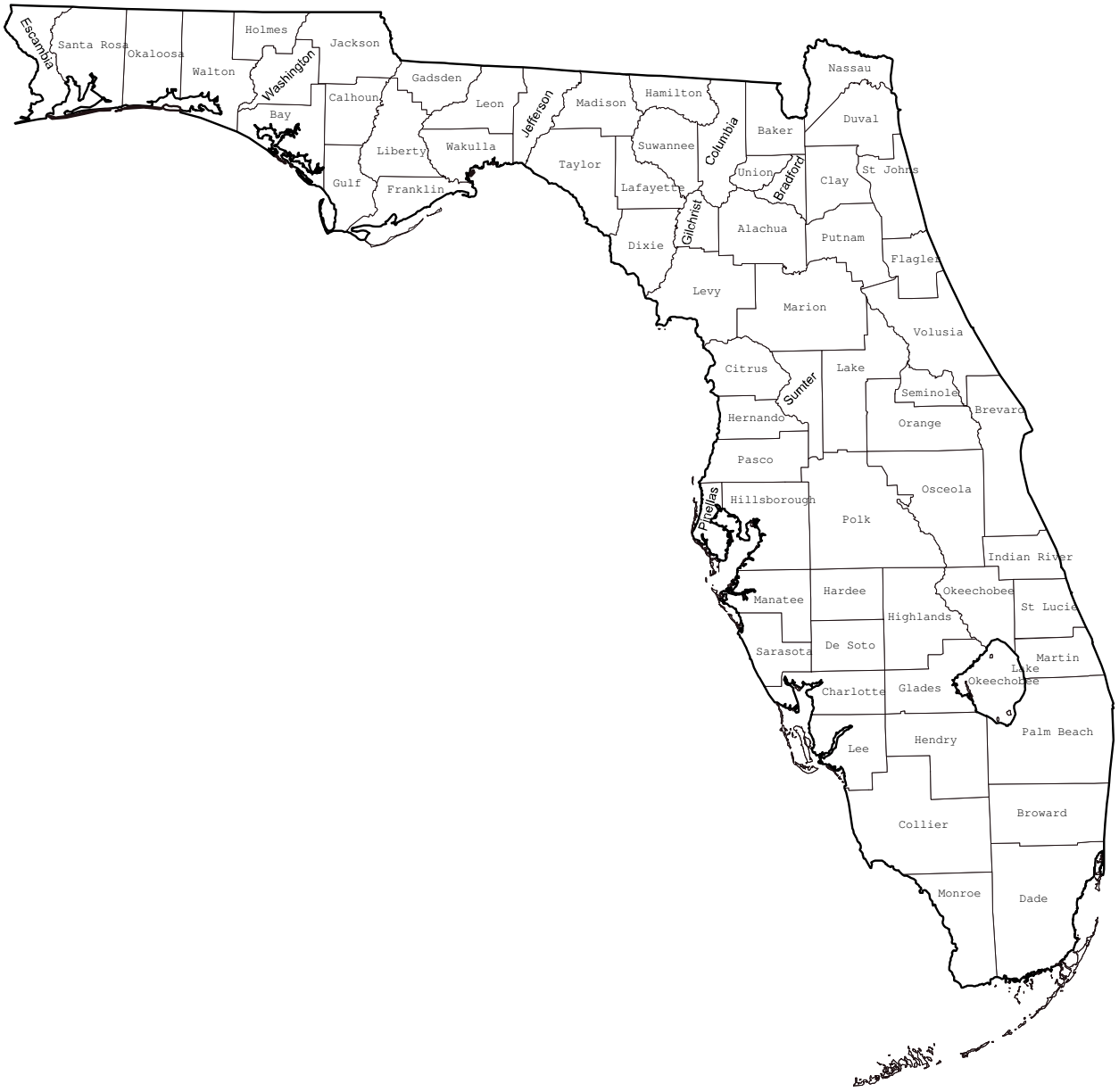
(05) Arkansas

(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


Benton
Carroll
Boone
Marion
Baxter
Fulton
Randolph
Clay
Washington
Madison
Newton
Searcy
Izard
Sharp
Lawrence
Greene
Stone
Independence
Craighead
Mississippi
Crawford
Franklin
Johnson
Pope
Van Buren
Cleburne
Jackson
Poinsett
Logan
Conway
White
Woodruff
Cross
Crittender
Sebastian
Faulkner
St. Francis
Yell
Perry
Prairie
Scott
Pulaski
Lonoke
Lee
Saline
Monroe
Polk
Montgomery
Garland
Phillips
Hot Spring
Grant
Jefferson
Arkansas
Howard
Pike
Sevier
Clark
Dallas
Cleveland
Lincoln
Desha
Little River
Hempstead
Nevada
Ouachita
Calhoun
Bradley
Drew
Miller
Lafayette
Columbia
Union
Ashley
Chicot

(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


Escambia
Santa Rosa
Okaloosa
Walton
Holmes
Washington
Bay
Jackson
Calhoun
Gulf
Liberty
Franklin
Gadsden
Leon
Wakulla
Jefferson
Madison
Taylor
Hamilton
Suwannee
Lafayette
Columbia
Baker
Union
Bradford
Nassau
Duval
Clay
St Johns
Gilchrist
Dixie
Alachua
Putnam
Flagler
Levy
Marion
Volusia
Citrus
Sumter
Lake
Seminole
Brevard
Hernando
Orange
Pasco
Osceola
Pinellas
Hillsborough
Polk
Indian River
Manatee
Hardee
Okeechobee
St Lucie
Highlands
Sarasota
De Soto
Martin
Lake
Okeechobee
Charlotte
Glades
Palm Beach
Lee
Hendry
Broward
Collier
Monroe
Dade

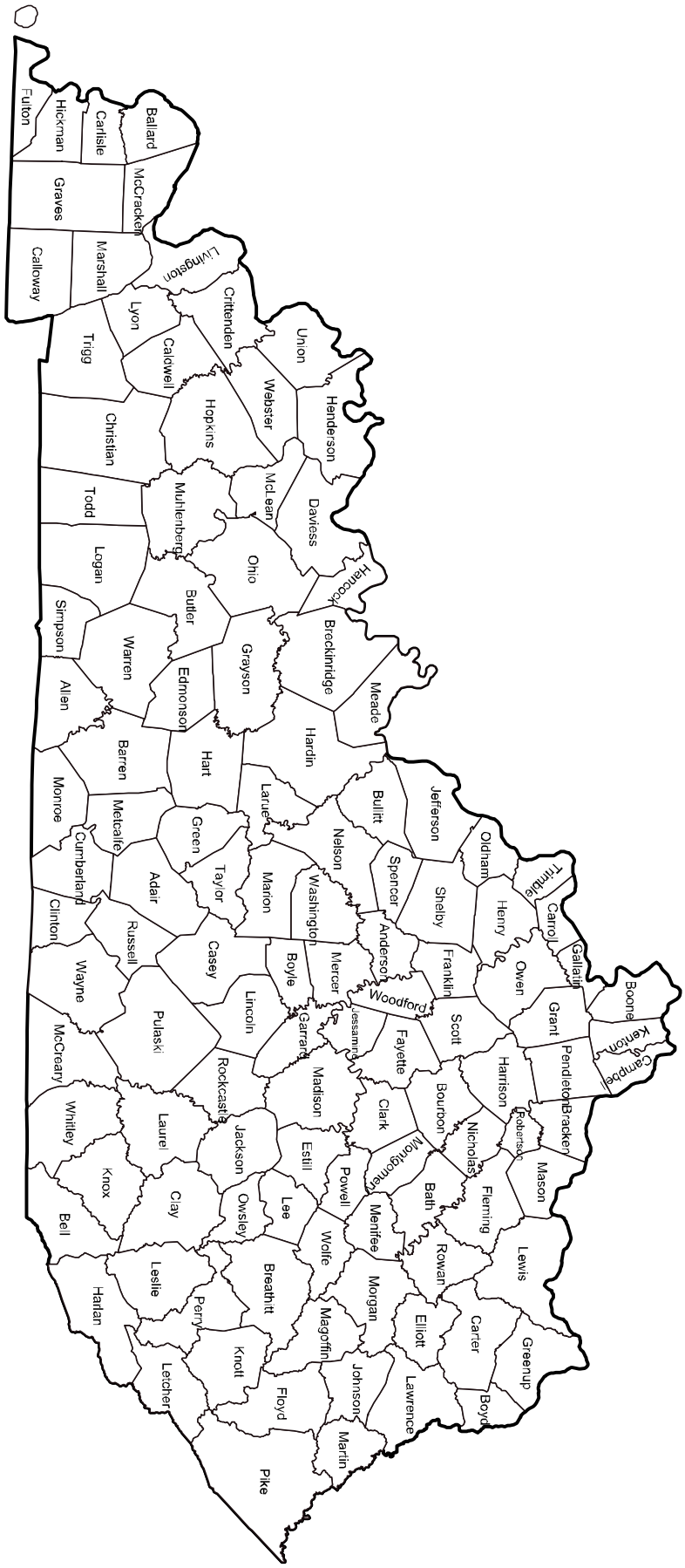
(13) Georgia

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


Dade
Catoosa
Whitfield
Murray
Fannin
Towns
Union
Rabun
Walker
Gilmer
White
Habersham
Chattooga
Gordon
Lumpkin
Stephens
Pickens
Franklin
Dawson
Hall
Banks
Hart
Floyd
Bartow
Cherokee
Forsyth
Jackson
Madison
Elbert
Polk
Barrow
Cobb
Gwinnett
Clarke
Oglethorpe
Paulding
Haralson
Oconee
Douglas
De Kalb
Walton
Wilkes
Lincoln
Fulton
Rockdale
Carroll
Clayton
Newton
Morgan
Greene
Taliaferro
Columbia
Fayette
Henry
Mc Duffie
Warren
Heard
Coweta
Richmond
Spalding
Butts
Jasper
Putnam
Hancock
Glascock
Troupe
Meriwether
Pike
Lamar
Monroe
Jones
Baldwin
Jefferson
Burke
Washington
Upson
Bibb
Wilkinson
Jenkins
Screven
Harris
Talbot
Crawford
Twiggs
Johnson
Emanuel
Muscogee
Taylor
Peach
Laurens
Houston
Bleckley
Treutlen
Candler
Bulloch
Effingham
Chattahoochee
Marion
Macon
Schley
Dooly
Pulaski
Dodge
Wheeler
Montgomery
Toombs
Evans
Stewart
Webster
Sumter
Wilcox
Tattnall
Bryan
Chatham
Crisp
Telfair
Quitman
Terrell
Lee
Jeff Davis
Appling
Liberty
Randolph
Turner
Ben Hill
Long
Clay
Calhoun
Dougherty
Worth
Irwin
Coffee
Bacon
Wayne
McIntosh
Tift
Early
Baker
Berrien
Atkinson
Pierce
Glynn
Miller
Mitchell
Colquitt
Cook
Ware
Brantley
Seminole
Decatur
Grady
Thomas
Brooks
Lowndes
Lanier
Clinch
Charlton
Camden
Echols

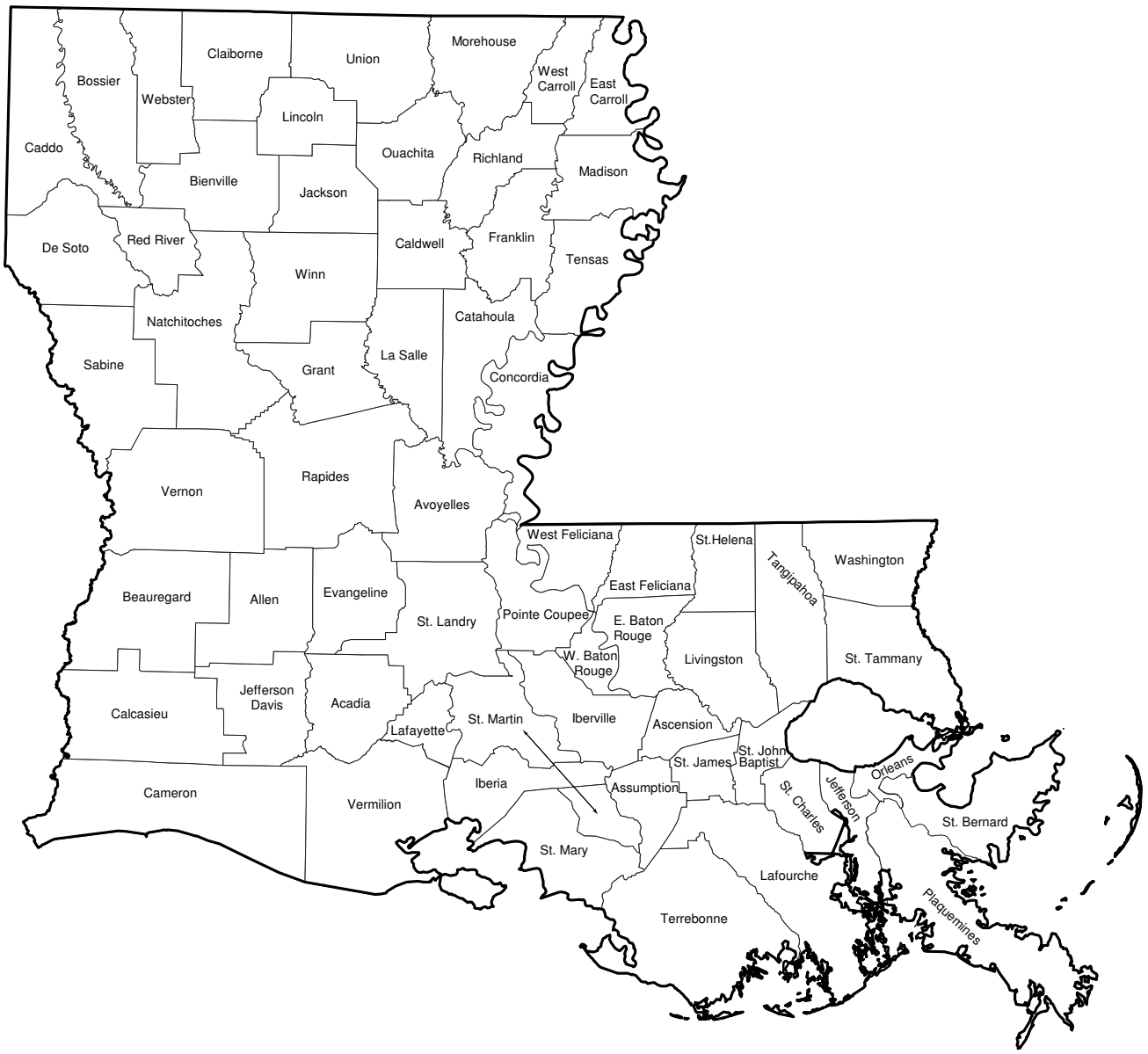
(21) Kentucky

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


Fulton
Hickman
Carlisle
Ballard
Graves
McCracken
Calloway
Marshall
Livingston
Lyon
Crittenden
Union
Trigg
Caldwell
Webster
Henderson
Christian
Hopkins
McLean
Todd
Muhlenberg
Daviess
Logan
Ohio
Hancock
Simpson
Butler
Breckinridge
Warren
Grayson
Meade
Allen
Edmonson
Hardin
Barren
Hart
Larue
Bullitt
Jefferson
Monroe
Metcalfe
Green
Nelson
Oldham
Trimble
Cumberland
Taylor
Marion
Spencer
Shelby
Henry
Carroll
Gallatin
Boone
Clinton
Adair
Washington
Anderson
Franklin
Owen
Russell
Casey
Boyle
Mercer
Woodford
Grant
Kenton
Campbell
Wayne
Lincoln
Garrard
Jessamine
Scott
Pendleton
Bracken
Pulaski
Fayette
Harrison
McCreary
Rockcastle
Madison
Clark
Bourbon
Robertson
Whitley
Laurel
Jackson
Estill
Montgomery
Nicholas
Mason
Knox
Clay
Owsley
Lee
Powell
Bath
Fleming
Bell
Menifee
Rowan
Lewis
Leslie
Wolfe
Morgan
Elliott
Carter
Harlan
Breathitt
Perry
Magoffin
Greenup
Knott
Johnson
Lawrence
Letcher
Floyd
Boyd
Martin
Pike

(22) Louisiana

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


Claiborne
Union
Morehouse
Bossier
Webster
West Carroll
East Carroll
Lincoln
Caddo
Ouachita
Richland
Madison
Bienville
Jackson
De Soto
Red River
Caldwell
Franklin
Tensas
Winn
Natchitoches
Catahoula
Sabine
Grant
La Salle
Concordia
Vernon
Rapides
Avoyelles
West Feliciana
St.Helena
Tangipahoa
Washington
East Feliciana
Beauregard
Allen
Evangeline
St. Landry
Pointe Coupee
E. Baton Rouge
W. Baton Rouge
Livingston
St. Tammany
Jefferson Davis
Acadia
Calcasieu
Lafayette
St. Martin
Iberville
Ascension
St. James
St. John Baptist
Orleans
Jefferson
St. Charles
St. Bernard
Cameron
Vermilion
Iberia
Assumption
St. Mary
Lafourche
Terrebonne
Plaquemines

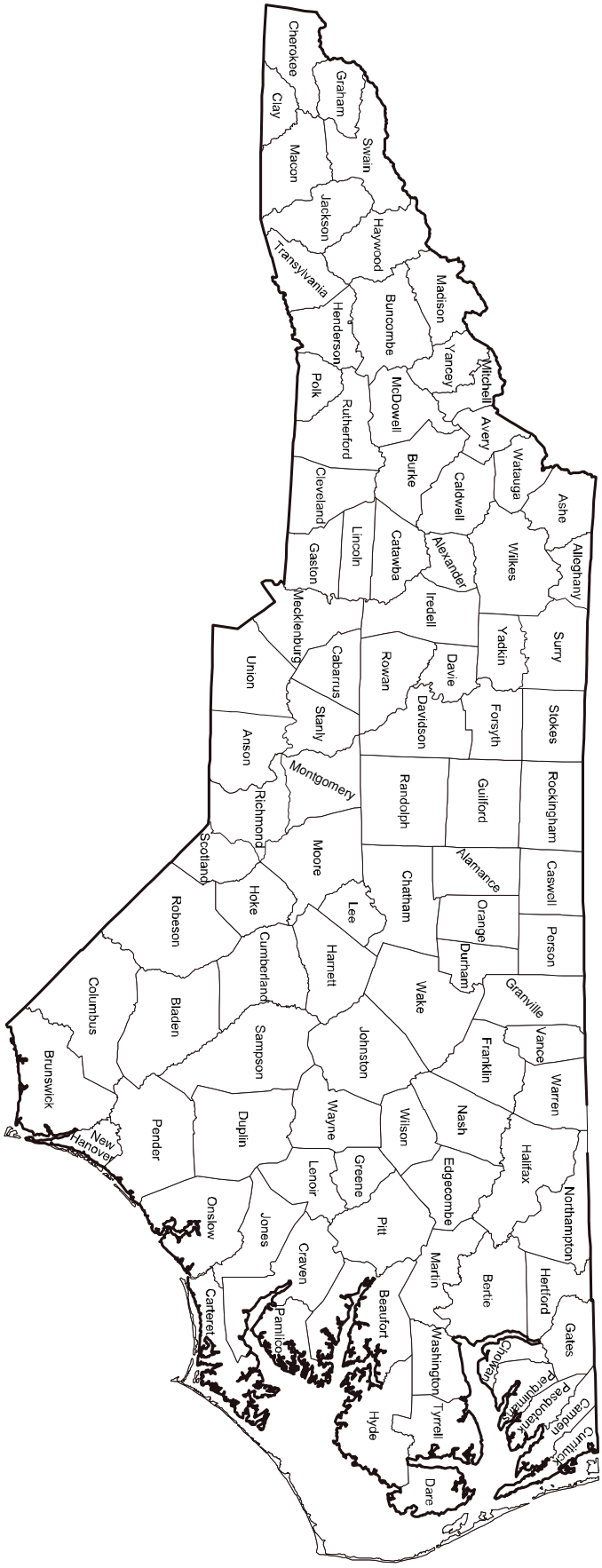
(28) Mississippi

(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


De Soto
Marshall
Benton
Tippah
Alcorn
Tishomingo
Tunica
Tate
Prentiss
Union
Panola
Lafayette
Lee
Itawamba
Coahoma
Quitman
Pontotoc
Yalobusha
Tallahatchie
Calhoun
Chickasaw
Monroe
Bolivar
Grenada
Clay
Webster
Sunflower
Leflore
Carroll
Montgomery
Washington
Oktibbeha
Lowndes
Choctaw
Humphreys
Holmes
Attala
Winston
Noxubee
Sharkey
Issaquena
Yazoo
Leake
Neshoba
Kemper
Madison
Warren
Scott
Newton
Lauderdale
Hinds
Rankin
Smith
Jasper
Clarke
Claiborne
Copiah
Simpson
Jefferson
Covington
Jones
Wayne
Lincoln
Adams
Franklin
Lawrence
Jefferson Davis
Forrest
Wilkinson
Amite
Pike
Walthall
Marion
Lamar
Perry
Greene
Pearl River
Stone
George
Harrison
Jackson
Handcock

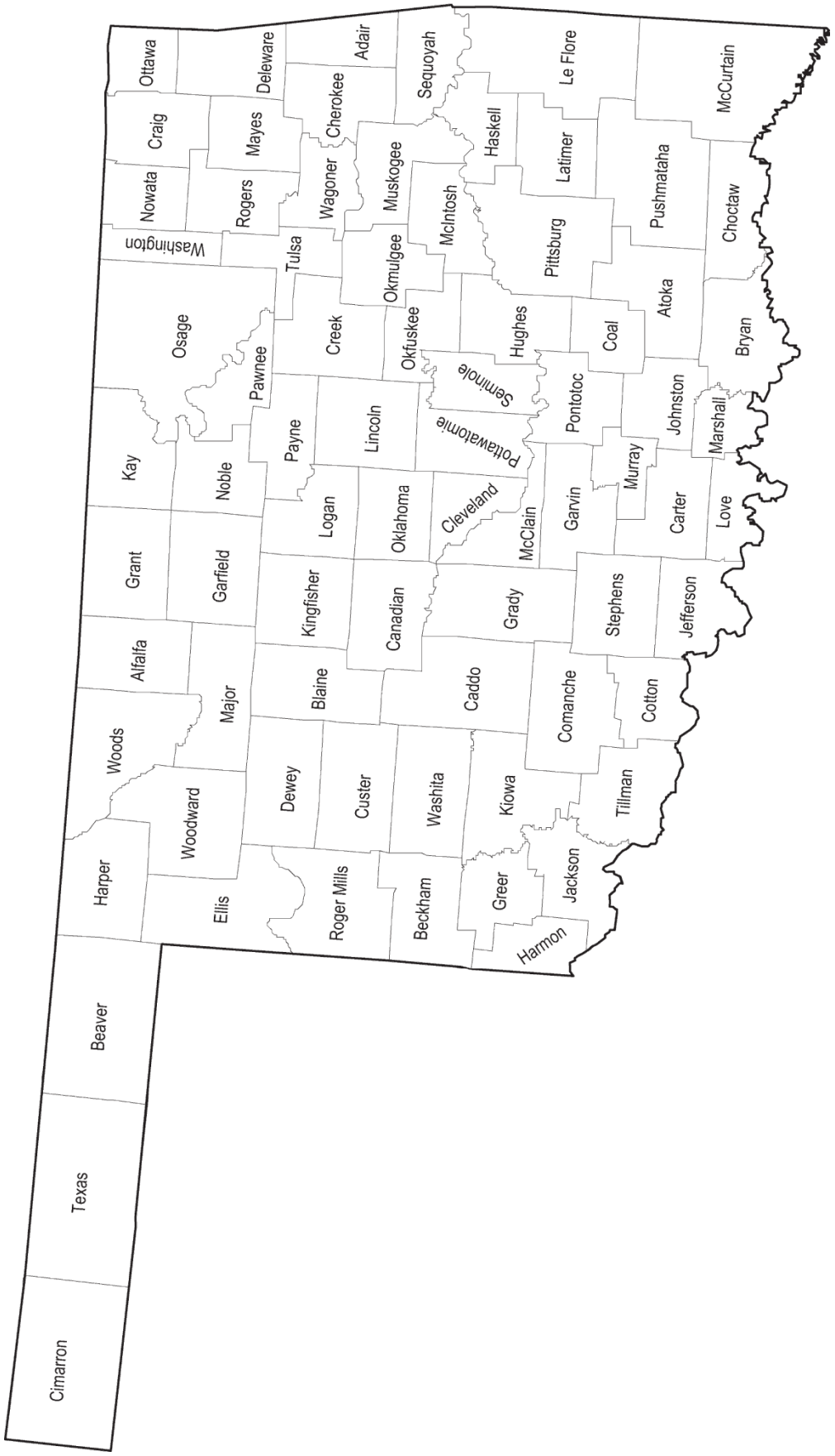
(37) North Carolina

(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


Cherokee
Clay
Graham
Macon
Swain
Jackson
Haywood
Transylvania
Henderson
Buncombe
Madison
Yancey
Mitchell
Avery
Polk
Rutherford
McDowell
Burke
Watauga
Ashe
Alleghany
Wilkes
Caldwell
Cleveland
Lincoln
Gaston
Catawba
Alexander
Iredell
Mecklenburg
Union
Cabarrus
Rowan
Davie
Yadkin
Surry
Stanly
Davidson
Forsyth
Stokes
Anson
Montgomery
Randolph
Guilford
Rockingham
Richmond
Moore
Alamance
Caswell
Scotland
Hoke
Lee
Chatham
Orange
Person
Robeson
Cumberland
Harnett
Durham
Granville
Columbus
Bladen
Sampson
Wake
Vance
Johnston
Franklin
Warren
Brunswick
New Hanover
Pender
Duplin
Wayne
Wilson
Nash
Halifax
Northampton
Onslow
Jones
Lenoir
Greene
Edgecombe
Craven
Pitt
Martin
Bertie
Herford
Gates
Carteret
Pamlico
Beaufort
Washington
Tyrrell
Hyde
Dare
Currituck
Camden
Pasquotank
Perquimans
Chowan

(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


Ottawa
Deleware
Adair
Sequoyah
Le Flore
McCurtain
Craig
Mayes
Cherokee
Haskell
Latimer
Pushmataha
Choctaw
Nowata
Rogers
Wagoner
Muskogee
McIntosh
Pittsburg
Washington
Tulsa
Okmulgee
Atoka
Bryan
Osage
Pawnee
Creek
Okfuskee
Hughes
Coal
Seminole
Pontotoc
Johnston
Marshall
Kay
Noble
Payne
Lincoln
Pottawatomie
Murray
Carter
Love
Grant
Garfield
Logan
Oklahoma
Cleveland
McClain
Garvin
Kingfisher
Canadian
Grady
Stephens
Jefferson
Alfalfa
Major
Blaine
Caddo
Comanche
Cotton
Woods
Woodward
Dewey
Custer
Washita
Kiowa
Tillman
Harper
Ellis
Roger Mills
Beckham
Greer
Jackson
Harmon
Beaver
Texas
Cimarron

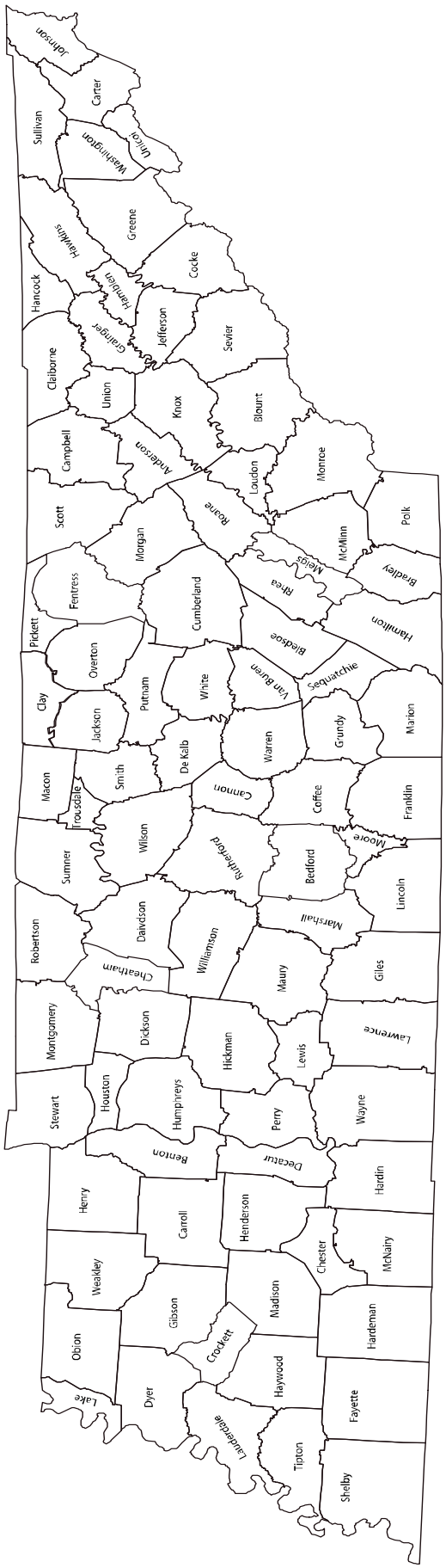
(45) South Carolina

(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

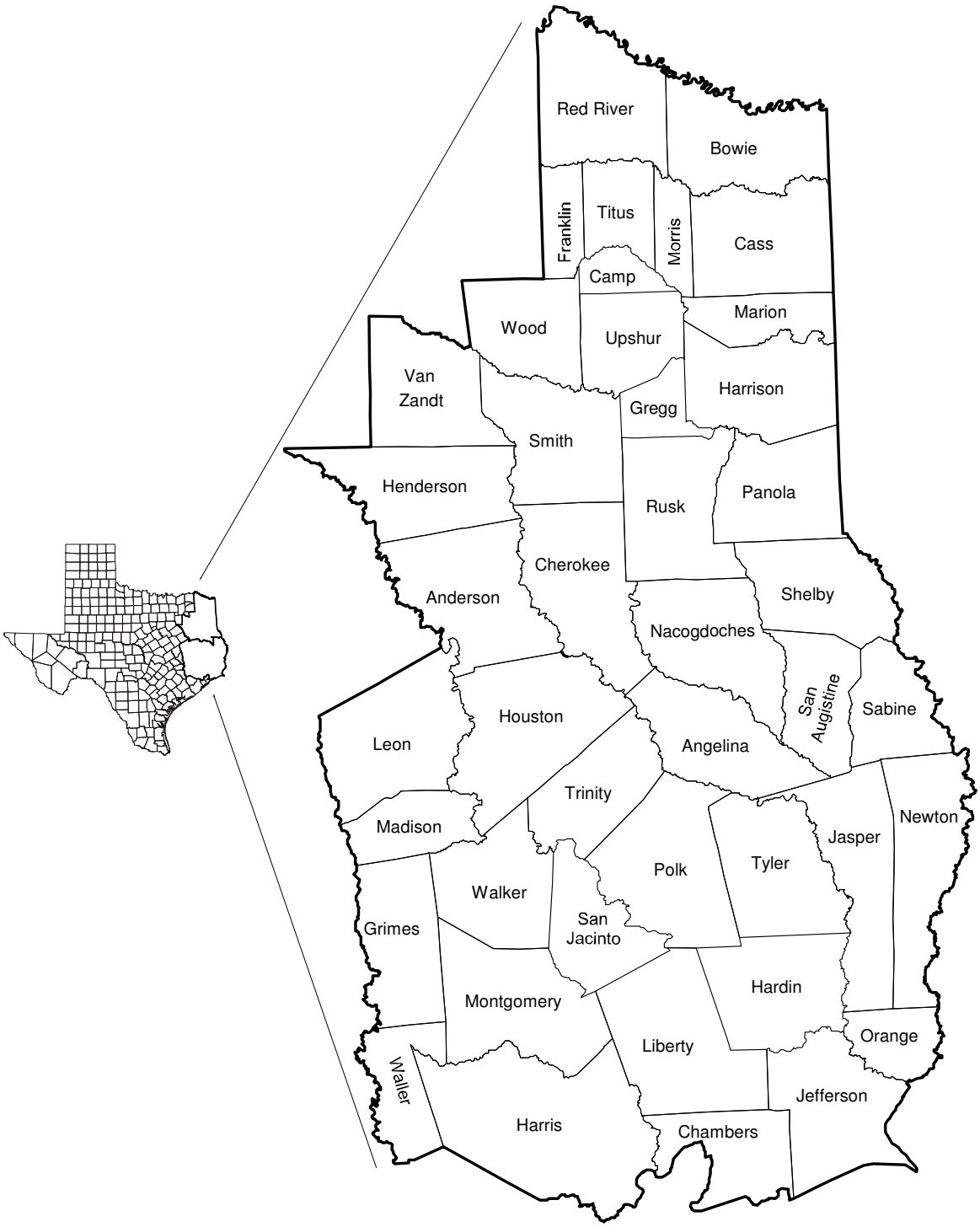

Oconee
Pickens
Greenville
Spartanburg
Cherokee
York
Anderson
Laurens
Union
Chester
Lancaster
Chesterfield
Marlboro
Dillon
Abbeville
Greenwood
Newberry
Fairfield
Kershaw
Darlington
Lee
Marion
Florence
Horry
McCormick
Saluda
Richland
Sumter
Edgefield
Lexington
Calhoun
Clarendon
Williamsburg
Georgetown
Aiken
Orangeburg
Barnwell
Bamberg
Dorchester
Berkeley
Allendale
Colleton
Charleston
Hampton
Jasper
Beaufort

(47) Tennessee

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


Johnson
Carter
Sullivan
Unicoi
Washington
Greene
Hawkins
Cocke
Hancock
Hamblen
Jefferson
Sevier
Grainger
Claiborne
Union
Knox
Blount
Campbell
Anderson
Loudon
Monroe
Scott
Roane
Polk
Morgan
McMinn
Meigs
Bradley
Fentress
Rhea
Cumberland
Hamilton
Pickett
Bledsoe
Overton
Sequatchie
Van Buren
Clay
Putnam
White
Grundy
Marion
Jackson
Warren
De Kalb
Macon
Smith
Cannon
Coffee
Franklin
Trousdale
Wilson
Moore
Sumner
Rutherford
Bedford
Lincoln
Marshall
Robertson
Davidson
Williamson
Maury
Giles
Cheatham
Montgomery
Dickson
Hickman
Lewis
Lawrence
Houston
Stewart
Humphreys
Perry
Wayne
Benton
Decatur
Hardin
Henry
Carroll
Henderson
Chester
McNairy
Weakley
Madison
Gibson
Hardeman
Obion
Crockett
Haywood
Fayette
Lake
Dyer
Lauderdale
Tipton
Shelby

(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


Red River
Bowie
Franklin
Titus
Morris
Cass
Camp
Marion
Wood
Upshur
Van Zandt
Harrison
Gregg
Smith
Henderson
Rusk
Panola
Cherokee
Anderson
Shelby
Nacogdoches
San Augistine
Sabine
Houston
Leon
Angelina
Trinity
Madison
Jasper
Newton
Polk
Tyler
Walker
Grimes
San Jacinto
Hardin
Montgomery
Orange
Liberty
Waller
Jefferson
Harris
Chambers

48) TEXAS (West)

(003) Andrews
(007) Aransas
(009) Archer
(011) Armstrong
(013) Atascosa
(015) Austin
(017) Bailey
(019) Bandera
(021) Bastrop
(023) Baylor
(025) Bee
(027) Bell
(029) Bexar
(031) Blanco
(033) Borden
(035) Bosque
(039) Brazoria
(041) Brazos
(043) Brewster
(045) Briscoe
(047) Brooks
(049) Brown
(051) Burleston
(053) Burnet
(055) Caldwell
(057) Calhoun
(059) Callahan
(061) Cameron
(065) Carson
(069) Castro
(075) Childress
(077) Clay
(079) Cochran
(081) Coke
(083) Coleman
(085) Collin
(087) Collingsworth
(089) Colorado
(091) Comal
(093) Comanche
(095) Concho
(097) Cooke
(099) Coryell
(101) Cottle
(103) Crane
(105) Crockett
(107) Crosby
(109) Culberson
(111) Dallam
(113) Dallas
(115) Dawson
(117) Deaf Smith
(119) Delta
(121) Denton
(123) De Witt
(125) Dickens
(127) Dimmit
(129) Donley
(131) Duval
(133) Eastland
(135) Ector
(137) Edwards
(139) Ellis
(141) El Paso
(143) Erath
(145) Falls
(147) Fannin
(149) Fayette
(151) Fisher
(153) Floyd
(155) Foard
(157) Fort Bend
(161) Freestone
(163) Frio
(165) Gaines
(167) Galveston
(169) Garza
(171) Gillespie
(173) Glasscock
(175) Goliad
(177) Gonzales
(179) Gray
(181) Grayson
(187) Guadalupe
(189) Hale
(191) Hall
(193) Hamilton
(195) Hansford
(197) Hardeman
(205) Hartley
(207) Haskell
(209) Hays
(211) Hemphill
(215) Hidalgo
(217) Hill
(219) Hockley
(221) Hood
(223) Hopkins
(227) Howard
(229) Hudspeth
(231) Hunt
(233) Hutchinson
(235) Irion
(237) Jack
(239) Jackson
(243) Jeff Davis
(247) Jim Hogg
(249) Jim Wells
(251) Johnson
(253) Jones
(255) Karnes
(257) Kaufman
(259) Kendall
(261) Kenedy
(263) Kent
(265) Kerr
(267) Kimble
(269) King
(271) Kinney
(273) Kleberg
(275) Knox
(277) Lamar
(279) Lamb
(281) Lampasas
(283) La Salle
(285) Lavaca
(287) Lee
(293) Limestone
(295) Lipscomb
(297) Live Oak
(299) Llano
(301) Loving
(303) Lubbock
(305) Lynn
(307) McCulloch
(309) McLennan
(311) McMullen
(317) Martin
(319) Mason
(321) Matagorda
(323) Maverick
(325) Medina
(327) Menard
(329) Midland
(331) Milam
(333) Mills
(335) Mitchell
(337) Montague
(341) Moore
(345) Motley
(349) Navarro
(353) Nolan
(355) Nueces
(357) Ochiltree
(359) Oldham
(363) Palo Pinto
(367) Parker
(369) Parmer
(371) Pecos
(375) Potter
(377) Presidio
(379) Rains
(381) Randall
(383) Reagan
(385) Real
(389) Reeves
(391) Refugio
(393) Roberts
(395) Robertson
(397) Rockwall
(399) Runnels
(409) San Patricio
(411) San Saba
(413) Schleicher
(415) Scurry
(417) Shackelford
(421) Sherman
(425) Somervell
(427) Starr
(429) Stephens
(431) Sterling
(433) Stonewall
(435) Sutton
(437) Swisher
(439) Tarrant
(441) Taylor
(443) Terrell
(445) Terry
(447) Throckmorton
(451) Tom Green
(453) Travis
(461) Upton
(463) Uvalde
(465) Val Verde
(469) Victoria
(475) Ward
(477) Washington
(479) Webb
(481) Wharton
(483) Wheeler
(485) Wichita
(487) Wilbarger
(489) Willacy
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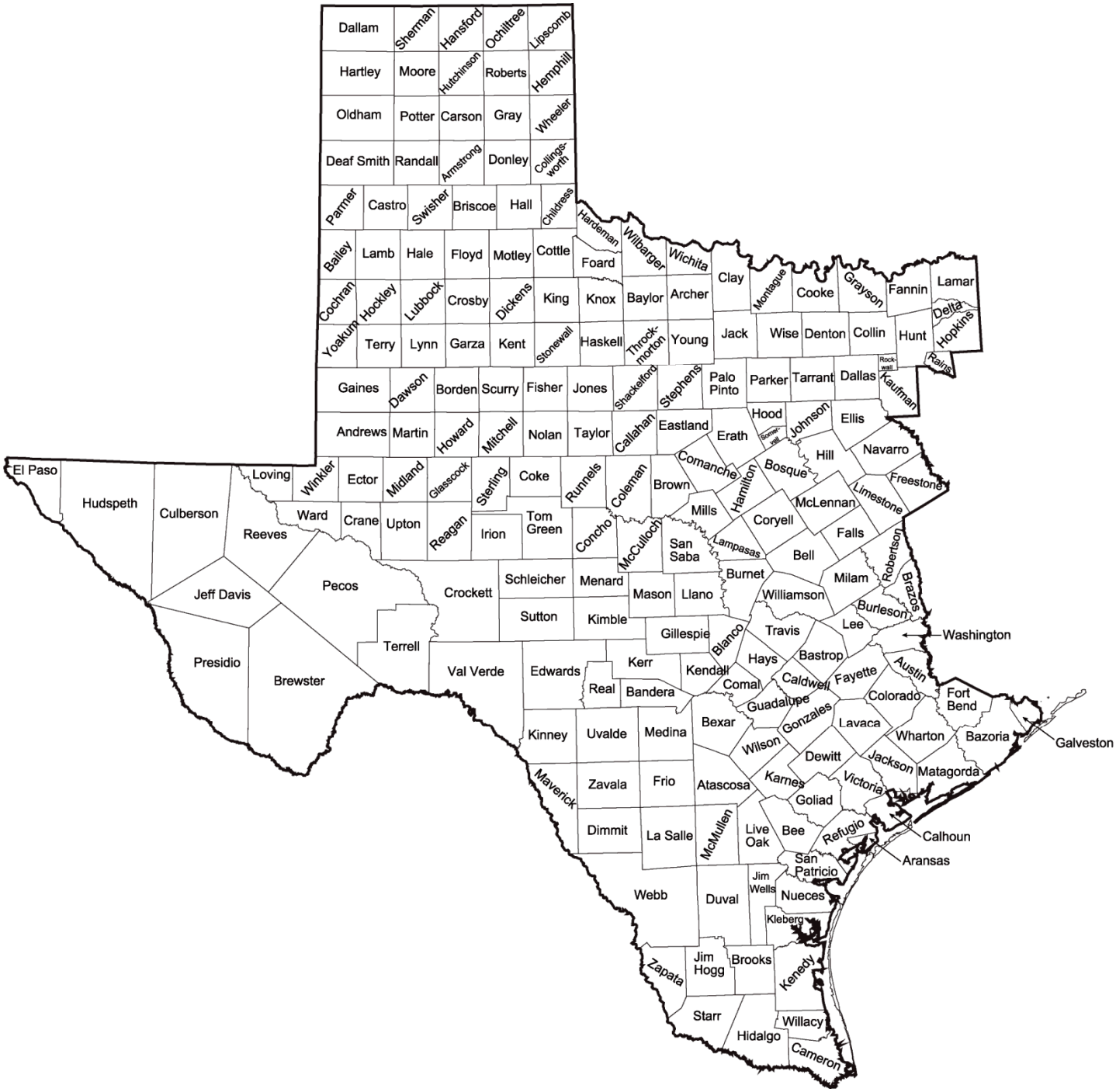
(493) Wilson
(495) Winkler
(497) Wise
(501) Yoakum
(503) Young
(505) Zapata
(507) Zavala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Deaf Smith
Randall
Armstrong
Donley
Collingsworth
Parmer
Castro
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Briscoe
Hall
Childress
Bailey
Lamb
Hale
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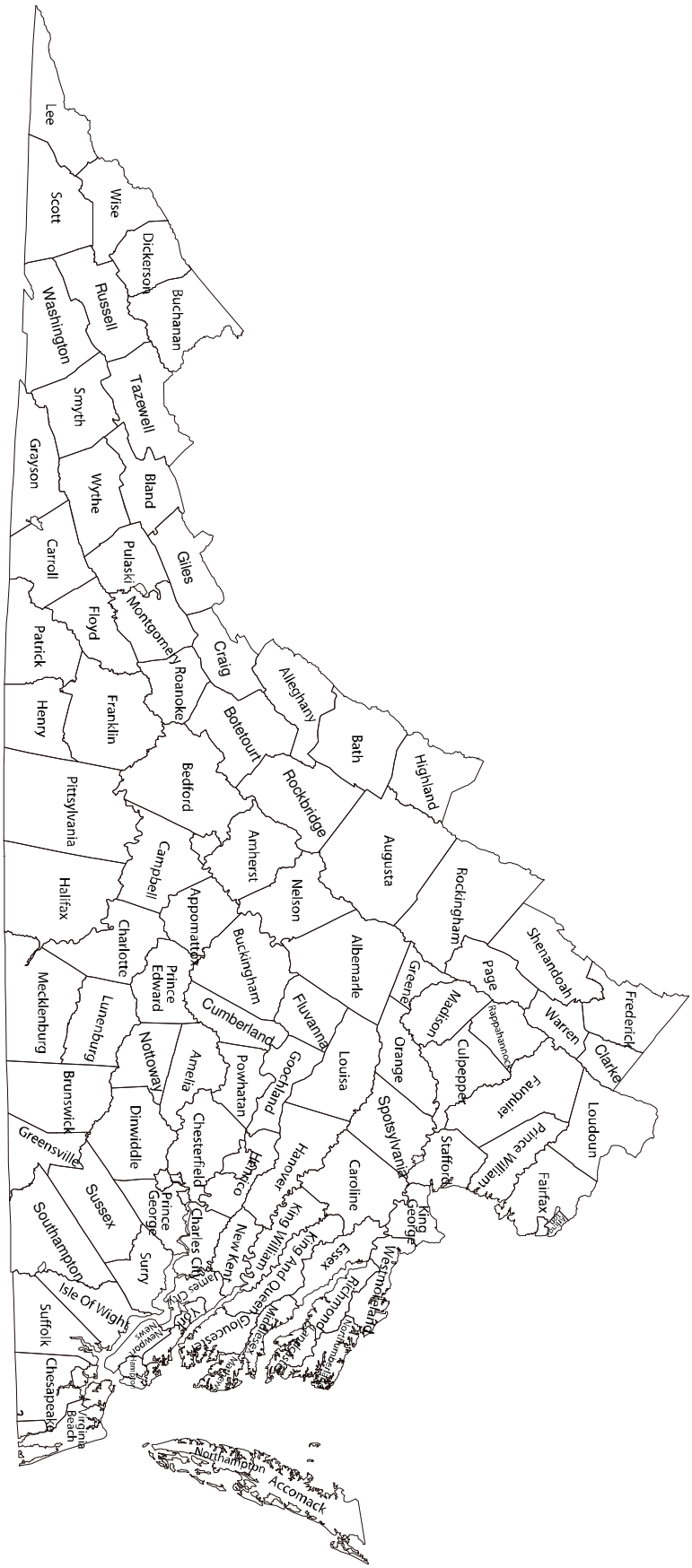
Cottle
Foard
Hardeman
Wilbarger
Wichita
Clay
Montague
Cooke
Grayson
Fannin
Lamar
Cochran
Hockley
Lubbock
Crosby
Dickens
King
Knox
Baylor
Archer
Delta
Hopkins
Yoakum
Terry
Lynn
Garza
Kent
Stonewall
Haskell
Throck-morton
Young
Jack
Wise
Denton
Collin
Hunt
Rains
Rock-wall
Gaines
Dawson
Borden
Scurry
Fisher
Jones
Shackelford
Stephens
Palo Pinto
Parker
Tarrant
Dallas
Kaufman
Andrews
Martin
Howard
Mitchell
Nolan
Taylor
Callahan
Eastland
Erath
Hood
Somer-vell
Johnson
Ellis
Hill
Navarro
Comanche
Bosque
Freestone
Limestone
El Paso
Hudspeth
Culberson
Loving
Winkler
Ector
Midland
Glasscock
Sterling
Coke
Runnels
Coleman
Brown
Hamilton
Mills
Coryell
McLennan
Falls
Robertson
Ward
Crane
Upton
Reagan
Irion
Tom Green
Concho
McCulloch
San Saba
Lampasas
Bell
Milam
Brazos
Reeves
Burnet
Williamson
Burleson
Lee
Jeff Davis
Pecos
Crockett
Schleicher
Menard
Mason
Llano
Sutton
Kimble
Gillespie
Travis
Washington
Blanco
Hays
Bastrop
Austin
Presidio
Brewster
Terrell
Val Verde
Edwards
Kerr
Kendall
Caldwell
Fayette
Fort Bend
Real
Bandera
Comal
Guadalupe
Colorado
Gonzales
Lavaca
Wharton
Bazoria
Galveston
Kinney
Uvalde
Medina
Bexar
Wilson
Dewitt
Jackson
Matagorda
Maverick
Zavala
Frio
Atascosa
Karnes
Victoria
Goliad
Dimmit
La Salle
McMullen
Live Oak
Bee
Refugio
Calhoun
Aransas
San Patricio
Jim Wells
Webb
Duval
Nueces
Kleberg
Zapata
Jim Hogg
Brooks
Kenedy
Starr
Willacy
Hidalgo
Cameron

(51) Virginia

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


Lee
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Dickerson
Buchanan
Washington
Russell
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Grayson
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Giles
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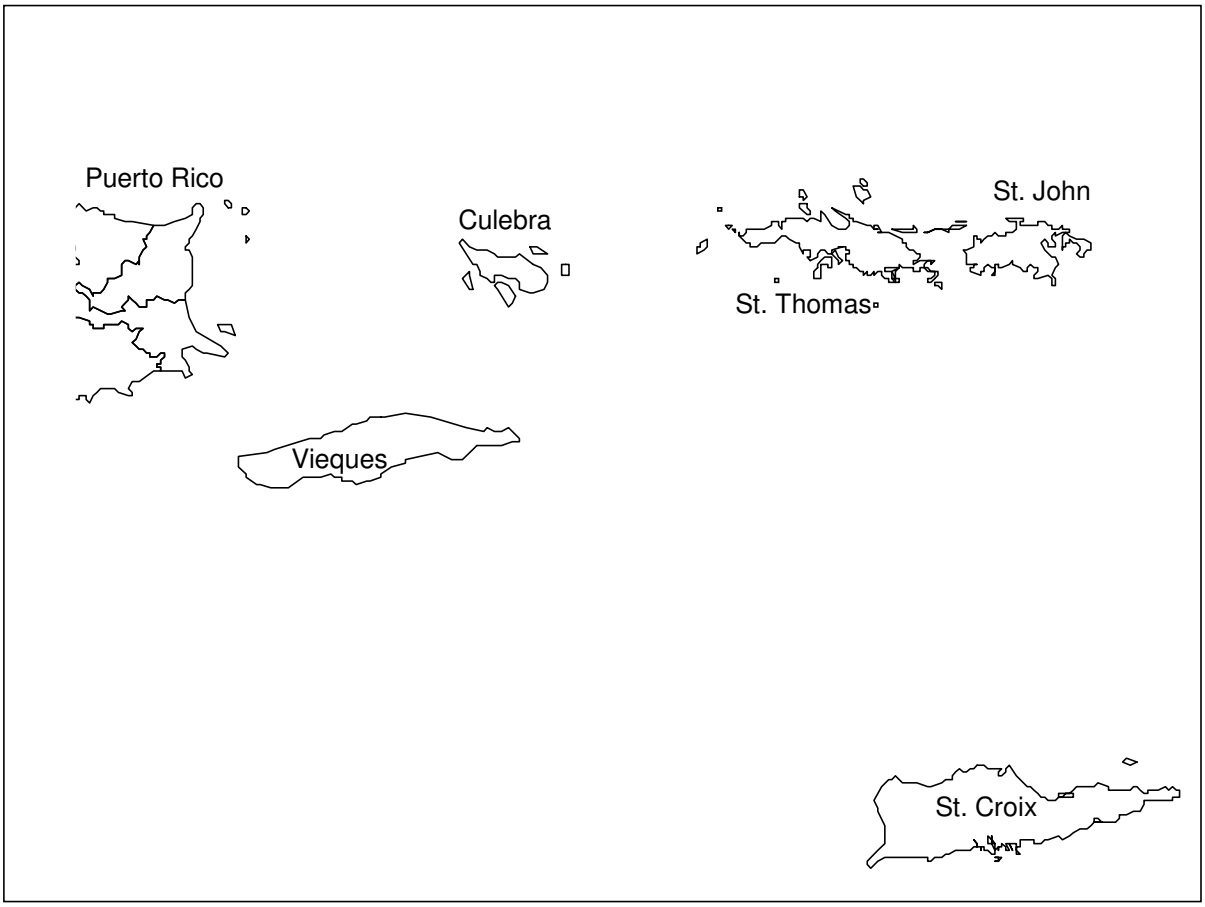
Pulaski
Montgomery
Floyd
Craig
Patrick
Roanoke
Alleghany
Henry
Franklin
Botetourt
Bath
Highland
Pittsylvania
Bedford
Rockbridge
Augusta
Rockingham
Shenandoah
Frederick
Halifax
Campbell
Amherst
Nelson
Albemarle
Greene
Page
Warren
Clarke
Charlotte
Appomattox
Buckingham
Prince Edward
Cumberland
Fluvanna
Orange
Culpeper
Rappahannock
Fauquier
Loudoun
Mecklenburg
Lunenburg
Nottoway
Amelia
Powhatan
Goochland
Louisa
Spotsylvania
Stafford
Prince William
Fairfax
Brunswick
Dinwiddie
Chesterfield
Hanover
Caroline
King George
Greensville
Sussex
Prince George
Henrico
Charles City
New Kent
King William
King And Queen
Essex
Westmoreland
Southampton
Surry
James City
York
Gloucester
Mathews
Richmond
Isle Of Wight
Suffolk
Newport News
Hampton
Chesapeake
Virginia Beach
Northampton
Accomack

(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


Fajardo
Ceiba
Luquillo
Naguabo
Rio Grande
Humacao
Las Piedras
Canovanas
Loiza
Juncos
Yabucoa
Maunabo
Carolina
Gurabo
San Lorenzo
Trujillo Alto
Patillas
San Juan
Caguas
Arroyo
Guaynabo
Aguas Buenas
Guayama
Catano
Bayamon
Cidra
Cayey
Toa Baja
Comerio
Toa Alta
Naranjito
Aibonito
Salinas
Dorado
Corozal
Barranquitas
Vega Alta
Coamo
Santa Isabel
Vega Baja
Morovis
Orocovis
Villalba
Juana Diaz
Manati
Ciales
Barceloneta
Jayuya
Ponce
Arecibo
Utuado
Adjuntas
Penuelas
Guayanilla
Hatillo
Camuy
Lares
Yauco
Quebradillas
Sabana Grande
Guanica
Isabela
San Sebastian
Las Marias
Maricao
San German
Lajas
Aguadilla
Moca
Anasco
Mayaguez
Hormigueros
Cabo Rojo
Aguada
Rincon


Puerto Rico
Culebra
St. John
St. Thomas
Vieques
St. Croix

Counties by State, Unit

ALABAMA - 01

UNIT 1 SOUTHWEST SOUTH

Baldwin	003	Escambia	053	Washington	129
Covington	039	Mobile	097		

UNIT 2 SOUTHWEST NORTH

Choctaw	023	Marengo	091	Sumter	119
Clarke	025	Monroe	099	Wilcox	131
Conecuh	035				

UNIT 3 SOUTHEAST

Autauga	001	Crenshaw	041	Lee	081
Barbour	005	Dale	045	Lowndes	085
Bullock	011	Dallas	047	Macon	087
Butler	013	Elmore	051	Mongomery	101
Chambers	017	Geneva	061	Pike	109
Chilton	021	Henry	067	Russell	113
Coffee	031	Houston	069	Tallapoosa	123

UNIT 4 WEST CENTRAL

Bibb	007	Hale	065	Perry	105
Fayette	057	Lamar	075	Pickens	107
Greene	063	Marion	093	Tuscaloosa	125

UNIT 5 NORTH CENTRAL

Blount	009	Coosa	037	St. Clair	115
Calhoun	015	Cullman	043	Shelby	117
Cherokee	019	Etowah	055	Talladega	121
Clay	027	Jefferson	073	Walker	127
Cleburne	029	Randolph	111	Winston	133

UNIT 6 NORTH

Colbert	033	Lauderdale	077	Madison	089
De Kalb	049	Lawrence	079	Marshall	095
Franklin	059	Limestone	083	Morgan	103
Jackson	071				

ARKANSAS - 05

UNIT 1 SOUTH DELTA

Arkansas	001	Lee	077	Phillips	107
Chicot	017	Lincoln	079	Prairie	117
Desha	041	Lonoke	085		
Jefferson	069	Monroe	095		

UNIT 2 NORTH DELTA

Clay	021	Greene	055	Poinsett	111
Craighead	031	Jackson	067	St. Francis	123
Crittenden	035	Lawrence	075	Woodruff	147
Cross	037	Mississippi	093		

UNIT 3 SOUTHWEST

Ashley	003	Drew	043	Miller	091
Bradley	011	Grant	053	Nevada	099
Calhoun	013	Hempstead	057	Ouachita	103
Clark	019	Hot Spring	059	Pike	109
Cleveland	025	Howard	061	Sevier	133
Columbia	027	Lafayette	073	Union	139
Dallas	039	Little River	081		

UNIT 4 OUACHITA

Garland	051	Polk	113	Scott	127
Logan	083	Pulaski	119	Sebastian	131
Montgomery	097	Saline	125	Yell	149
Perry	105				

UNIT 5 OZARK

Baxter	005	Franklin	047	Pope	115
Benton	007	Fulton	049	Randolph	121
Boone	009	Independence	063	Searcy	129
Carroll	015	Izard	065	Sharp	135
Cleburne	023	Johnson	071	Stone	137
Conway	029	Madison	087	Van Buren	141
Crawford	033	Marion	089	Washington	143
Faulkner	045	Newton	101	White	145

FLORIDA - 12

UNIT 1 NORTHEAST

Alachua	001	Flagler	035	Nassau	089
Baker	003	Gilchrist	041	Putnam	107
Bradford	007	Hamilton	047	St. Johns	109
Clay	019	Lafayette	067	Suwannee	121
Columbia	023	Levy	075	Taylor	123
Dixie	029	Madison	079	Union	125
Duval	031	Marion	083	Volusia	127

UNIT 2 NORTHWEST

Bay	005	Holmes	059	Santa Rosa	113
Calhoun	013	Jackson	063	Wakulla	129
Escambia	033	Jefferson	065	Walton	131
Franklin	037	Leon	073	Washington	133
Gadsden	039	Liberty	077		
Gulf	045	Okaloosa	091		

UNIT 3 CENTRAL

Brevard	009	Indian River	061	Pinellas	103
Citrus	017	Lake	069	Polk	105
De Soto	027	Manatee	081	St. Lucie	111
Hardee	049	Okeechobee	093	Sarasota	115
Hernando	053	Orange	095	Seminole	117
Highlands	055	Osceola	097	Sumter	119
Hillsborough	057	Pasco	101		

UNIT 4 SOUTH

Broward	011	Glades	043	Martin	085
Charlotte	015	Hendry	051	Monroe	087
Collier	021	Lee	071	Palm Beach	099
Dade	025				

GEORGIA - 13

UNIT 1 SOUTHEAST

Appling	001	Dodge	091	McIntosh	191
Atkinson	003	Echols	101	Montgomery	209
Bacon	005	Effingham	103	Pierce	229
Brantley	025	Emanuel	107	Screven	251
Bryan	029	Evans	109	Tattnall	267
Bulloch	031	Glynn	127	Telfair	271
Camden	039	Jeff Davis	161	Toombs	279
Candler	043	Jenkins	165	Treutlen	283
Charlton	049	Johnson	167	Ware	299
Chatham	051	Laurens	175	Wayne	305
Clinch	065	Liberty	179	Wheeler	309
Coffee	069	Long	183		

UNIT 2 SOUTHWEST

Baker	007	Dooly	093	Seminole	253
Ben Hill	017	Early	099	Thomas	275
Berrien	019	Grady	131	Tift	277
Brooks	027	Irwin	155	Turner	287
Colquitt	071	Lanier	173	Wilcox	315
Cook	075	Lowndes	185	Worth	321
Crisp	081	Miller	201		
Decatur	087	Mitchell	205		

UNIT 3 CENTRAL

Baldwin	009	Jefferson	163	Randolph	243
Bibb	021	Jones	169	Richmond	245
Bleckley	023	Lamar	171	Schley	249
Burke	033	Lee	177	Stewart	259
Butts	035	Lincoln	181	Sumter	261
Calhoun	037	McDuffie	189	Talbot	263
Chattahoochee	053	Macon	193	Taliaferro	265
Clay	061	Marion	197	Taylor	269
Columbia	073	Monroe	207	Terrell	273
Crawford	079	Morgan	211	Twiggs	289
Dougherty	095	Muscogee	215	Upson	293
Glascock	125	Peach	225	Warren	301
Greene	133	Pike	231	Washington	303
Hancock	141	Pulaski	235	Webster	307
Harris	145	Putnam	237	Wilkes	317
Houston	153	Quitman	239	Wilkinson	319
Jasper	159				

UNIT 4 NORTH CENTRAL

Banks	011	Forsyth	117	Meriwether	199
Barrow	013	Franklin	119	Newton	217
Carroll	045	Fulton	121	Oconee	219
Clarke	059	Gwinnett	135	Oglethorpe	221
Clayton	063	Hall	139	Paulding	223
Cobb	067	Haralson	143	Polk	233
Coweta	077	Hart	147	Rockdale	247
Dekalb	089	Heard	149	Spalding	255
Douglas	097	Henry	151	Troup	285
Elbert	105	Jackson	157	Walton	297
Fayette	113	Madison	195		

GEORGIA (cont)

UNIT 5 NORTH

Bartow	015	Floyd	115	Rabun	241
Catoosa	047	Gilmer	123	Stephens	257
Chattooga	055	Gordon	129	Towns	281
Cherokee	057	Habersham	137	Union	291
Dade	083	Lumpkin	187	Walker	295
Dawson	085	Murray	213	White	311
Fannin	111	Pickens	227	Whitfield	313

KENTUCKY - 21

UNIT 1 EASTERN

Floyd	071	Leslie	131	Perry	193
Harlan	095	Letcher	133	Pike	195
Knott	119	Martin	159		

UNIT 2 NORTHERN CUMBERLAND

Boyd	019	Lawrence	127	Morgan	175
Carter	043	Lewis	135	Powell	197
Elliott	063	Magoffin	153	Rowan	205
Greenup	089	Menifee	165	Wolfe	237
Johnson	115				

UNIT 3 SOUTHERN CUMBERLAND

Bell	013	Jackson	109	McCreary	147
Breathitt	025	Knox	121	Owsley	189
Clay	051	Laurel	125	Rockcastle	203
Estill	065	Lee	129	Whitley	235

UNIT 4 BLUEGRASS

Anderson	005	Gallatin	077	Montgomery	173
Bath	011	Garrard	079	Nicholas	181
Boone	015	Grant	081	Oldham	185
Bourbon	017	Harrison	097	Owen	187
Boyle	021	Henry	103	Pendleton	191
Bracken	023	Jefferson	111	Robertson	201
Campbell	037	Jessamine	113	Scott	209
Carroll	041	Kenton	117	Shelby	211
Clark	049	Lincoln	137	Spencer	215
Fayette	067	Madison	151	Trimble	223
Fleming	069	Mason	161	Washington	229
Franklin	073	Mercer	167	Woodford	239

UNIT 5 PENNYROYAL

Adair	001	Green	087	Metcalfe	169
Breckinridge	027	Hancock	091	Nelson	179
Bullitt	029	Hardin	093	Pulaski	199
Casey	045	Hart	099	Russell	207
Clinton	053	Larue	123	Taylor	217
Cumberland	057	Marion	155	Wayne	231
Grayson	085	Meade	163		

UNIT 6 WESTERN COALFIELD

Allen	003	Edmonson	061	Ohio	183
Barren	009	Henderson	101	Simpson	213
Butler	031	Hopkins	107	Todd	219
Caldwell	033	Logan	141	Union	225
Christian	047	McLean	149	Warren	227
Crittenden	055	Monroe	171	Webster	233
Daviess	059	Muhlenberg	177		

UNIT 7 WESTERN

Ballard	007	Graves	083	McCracken	145
Calloway	035	Hickman	105	Marshall	157
Carlisle	039	Livingston	139	Trigg	221
Fulton	075	Lyon	143		

LOUISIANA - 22

UNIT 1 NORTH DELTA

Catahoula	025	Franklin	041	Richland	083
Concordia	029	Madison	065	Tensas	107
E. Carroll	035	Morehouse	067	W. Carroll	123

UNIT 2 SOUTH DELTA

Acadia	001	Lafayette	055	St.John Baptist	095
Ascension	005	Lafourche	057	St. Landry	097
Assumption	007	Orleans	071	St. Martin	099
Avoyelles	009	Plaquemines	075	St. Mary	101
Cameron	023	Pointe Coupee	077	Terrebonne	109
Iberia	045	St. Bernard	087	Vermilion	113
Iberville	047	St. Charles	089	W. Baton Rouge	121
Jefferson	051	St. James	093	W. Feliciana	125

UNIT 3 SOUTHWEST

Allen	003	Grant	043	Rapides	079
Beauregard	011	Jefferson Davis	053	Sabine	085
Calcasieu	019	La Salle	059	Vernon	115
Evangeline	039	Natchitoches	069		

UNIT 4 SOUTHEAST

E. Baton Rouge	033	St. Helena	091	Tangipahoa	105
E. Feliciana	037	St. Tammany	103	Washington	117
Livingston	063				

UNIT 5 NORTHWEST

Bienville	013	De Soto	031	Red River	081
Bossier	015	Jackson	049	Union	111
Caddo	017	Lincoln	061	Webster	119
Caldwell	021	Ouachita	073	Winn	127
Claiborne	027				

MISSISSIPPI - 28

UNIT 1 DELTA

Bolivar	011	Leflore	083	Tunica	143
Coahoma	027	Quitman	119	Warren	149
Holmes	051	Sharkey	125	Washington	151
Humphreys	053	Sunflower	133	Yazoo	163
Issaquena	055	Tallahatchie	135		

UNIT 2 NORTH

Alcorn	003	Itawamba	057	Pontotoc	115
Benton	009	Lafayette	071	Prentiss	117
Calhoun	013	Lee	081	Tate	137
Carroll	015	Lowndes	087	Tippah	139
Chickasaw	017	Marshall	093	Tishomingo	141
Choctaw	019	Monroe	095	Union	145
Clay	025	Montgomery	097	Webster	155
De Soto	033	Oktibbeha	105	Yalobusha	161
Grenada	043	Panola	107		

UNIT 3 CENTRAL

Attala	007	Leake	079	Scott	123
Clarke	023	Neshoba	099	Simpson	127
Jasper	061	Newton	101	Smith	129
Kemper	069	Noxubee	103	Winston	159
Lauderdale	075	Rankin	121		

UNIT 4 SOUTH

Covington	031	Jackson	059	Pearl River	109
Forrest	035	Jefferson Davis	065	Perry	111
George	039	Jones	067	Stone	131
Greene	041	Lamar	073	Walthall	147
Hancock	045	Lawrence	077	Wayne	153
Harrison	047	Marion	091		

UNIT 5 SOUTHWEST

Adams	001	Franklin	037	Madison	089
Amite	005	Hinds	049	Pike	113
Claiborne	021	Jefferson	063	Wilkinson	157
Copiah	029	Lincoln	085		

NORTH CAROLINA - 37

UNIT 1 SOUTHERN COASTAL PLAIN

Bladen	017	Hoke	093	Onslow	133
Brunswick	019	Johnston	101	Pender	141
Columbus	047	Jones	103	Richmond	153
Cumberland	051	Lee	105	Robeson	155
Duplin	061	Lenoir	107	Sampson	163
Greene	079	Moore	125	Scotland	165
Harnett	085	New Hanover	129	Wayne	191

UNIT 2 NORTHERN COASTAL PLAIN

Beaufort	013	Edgecombe	065	Pamlico	137
Bertie	015	Gates	073	Pasquotank	139
Camden	029	Halifax	083	Perquimans	143
Carteret	031	Hertford	091	Pitt	147
Chowan	041	Hyde	095	Tyrrell	177
Craven	049	Martin	117	Washington	187
Currituck	053	Nash	127	Wilson	195
Dare	055	Northampton	131		

UNIT 3 PIEDMONT

Alamance	001	Franklin	069	Rockingham	157
Alexander	003	Gaston	071	Rowan	159
Anson	007	Granville	077	Rutherford	161
Cabarrus	025	Guilford	081	Stanly	167
Caswell	033	Iredell	097	Stokes	169
Catawba	035	Lincoln	109	Surry	171
Chatham	037	Mecklenburg	119	Union	179
Cleveland	045	Montgomery	123	Vance	181
Davidson	057	Orange	135	Wake	183
Davie	059	Person	145	Warren	185
Durham	063	Polk	149	Yadkin	197
Forsyth	067	Randolph	151		

UNIT 4 MOUNTAINS

Alleghany	005	Clay	043	Madison	115
Ashe	009	Graham	075	Mitchell	121
Avery	011	Haywood	087	Swain	173
Buncombe	021	Henderson	089	Transylvania	175
Burke	023	Jackson	099	Watauga	189
Caldwell	027	McDowell	111	Wilkes	193
Cherokee	039	Macon	113	Yancey	199

OKLAHOMA - 40

UNIT 1 SOUTHEAST.

Atoka	005	Haskell	061	McCurtain	089
Bryan	013	Latimer	077	Pittsburg	121
Choctaw	023	Le Flore	079	Pushmataha	127
Coal	029				

UNIT 2 NORTHEAST

Adair	001	McIntosh	091	Ottawa	115
Cherokee	021	Mayes	097	Sequoyah	135
Delaware	041	Muskogee	101		

UNIT 3 NORTHCENTRAL

Craig	035	Pawnee	117	Tulsa	143
Creek	037	Payne	119	Wagoner	145
Nowata	105	Rogers	131	Washington	147
Osage	113				

UNIT 4 SOUTHCENTRAL

Carter	019	Logan	083	Oklahoma	109
Cleveland	027	Love	085	Okmulgee	111
Garvin	049	McClain	087	Pontotoc	123
Hughes	063	Marshall	095	Pottawatomie	125
Johnston	069	Murray	099	Seminole	133
Lincoln	081	Okfuskee	107		

UNIT 5 SOUTHWEST

Beckham	009	Dewey	043	Kingfisher	073
Blaine	011	Grady	051	Kiowa	075
Caddo	015	Greer	055	Roger Mills	129
Canadian	017	Harmon	057	Stephens	137
Comanche	031	Jackson	065	Tillman	141
Cotton	033	Jefferson	067	Washita	149
Custer	039				

UNIT 6 HIGH PLAINS

Beaver	007	Ellis	045	Texas	139
Cimarron	025	Harper	059		

UNIT 7 GREAT PLAINS

Alfalfa	003	Kay	071	Woods	151
Garfiled	047	Major	093	Woodward	153
Grant	053	Noble	103		

SOUTH CAROLINA - 45

UNIT 1 SOUTHERN COASTAL PLAIN

Aiken	003	Beaufort	013	Hampton	049
Allendale	005	Calhoun	017	Jasper	053
Bamberg	009	Colleton	029	Lexington	063
Barnwell	011	Dorchester	035	Orangeburg	075

UNIT 2 NORTHERN COASTAL PLAIN

Berkeley	015	Florence	041	Marion	067
Charleston	019	Georgetown	043	Marlboro	069
Chesterfield	025	Horry	051	Richland	079
Clarendon	027	Kershaw	055	Sumter	085
Darlington	031	Lee	061	Williamsburg	089
Dillon	033				

UNIT 3 PIEDMONT

Abbeville	001	Greenville	045	Oconee	073
Anderson	007	Greenwood	047	Pickens	077
Cherokee	021	Lancaster	057	Saluda	081
Chester	023	Laurens	059	Spartanburg	083
Edgefield	037	McCormick	065	Union	087
Fairfield	039	Newberry	071	York	091

TENNESSEE - 47

UNIT 1 WEST

Carroll	017	Hardeman	069	McNairy	109
Chester	023	Haywood	075	Madison	113
Crockett	033	Henderson	077	Obion	131
Dyer	045	Henry	079	Shelby	157
Fayette	047	Lake	095	Tipton	167
Gibson	053	Lauderdale	097	Weakley	183

UNIT 2 WEST CENTRAL

Benton	005	Houston	083	Perry	135
Decatur	039	Humphreys	085	Stewart	161
Hardin	071	Lawrence	099	Wayne	181
Hickman	081	Lewis	101		

UNIT 3 CENTRAL

Bedford	003	Giles	055	Robertson	147
Cannon	015	Jackson	087	Rutherford	149
Cheatham	021	Lincoln	103	Smith	159
Clay	027	Macon	111	Sumner	165
Coffee	031	Marshall	117	Trousdale	169
Davidson	037	Maury	119	Williamson	187
De Kalb	041	Montgomery	125	Wilson	189
Dickson	043	Moore	127		

UNIT 4 PLATEAU

Bledsoe	007	Marion	115	Sequatchie	153
Campbell	013	Morgan	129	Van Buren	175
Cumberland	035	Overton	133	Warren	177
Fentress	049	Pickett	137	White	185
Franklin	051	Putnam	141		
Grundy	061	Scott	151		

UNIT 5 EAST

Anderson	001	Hamilton	065	Monroe	123
Blount	009	Hancock	067	Polk	139
Bradley	011	Hawkins	073	Rhea	143
Carter	019	Jefferson	089	Roane	145
Claiborne	025	Johnson	091	Sevier	155
Cocke	029	Knox	093	Sullivan	163
Grainger	057	Loudon	105	Unicoi	171
Greene	059	McMinn	107	Union	173
Hamblen	063	Meigs	121	Washington	179

TEXAS – 48 (East)

UNIT 1 SOUTHEAST

Angelina	005	Leon	289	San Augustine	405
Chambers	071	Liberty	291	San Jacinto	407
Grimes	185	Madison	313	Trinity	455
Hardin	199	Montgomery	339	Tyler	457
Harris	201	Newton	351	Walker	471
Houston	225	Orange	361	Waller	473
Jasper	241	Polk	373		
Jefferson	245	Sabine	403		

UNIT 2 NORTHEAST

Anderson	001	Harrison	203	Rusk	401
Bowie	037	Henderson	213	Shelby	419
Camp	063	Marion	315	Smith	423
Cass	067	Morris	343	Titus	449
Cherokee	073	Nacogdoches	347	Upshur	459
Franklin	159	Panola	365	Van Zandt	467
Gregg	183	Red River	387	Wood	499

TEXAS – 48 (West)

UNIT 3

Austin	015	Ellis	139	Kaufman	257
Bastrop	021	Falls	145	Lamar	277
Brazos	041	Fannin	147	Lavaca	285
Burleson	051	Fayette	149	Lee	287
Caldwell	055	Freestone	161	Limestone	293
Clay	077	Goliad	175	Milam	331
Guadalupe	187	Grayson	181	Montague	337
Collin	085	Hill	217	Navarro	349
Colorado	089	Hopkins	223	Parker	367
Cooke	097	Hunt	231	Rains	379
Dallas	113	Hopkins	223	Robertson	395
Delta	119	Hunt	231	Tarrant	439
Denton	121	Jack	237	Washington	477
De Witt	123	Johnson	251	Wise	497
				Young	503

UNIT 4

Aransas	007	Hildalgo	215	Nueces	355
Atascosa	013	Jackson	239	Refugio	391
Bee	025	Jim Hogg	247	San Patricio	409
Brazoria	039	Jim Wells	249	Starr	427
Brooks	047	Karnes	255	Victoria	469
Calhoun	057	Kenedy	261	Webb	479
Cameron	061	Kleberg	273	Wharton	481
Dimmit	127	La Salle	283	Willacy	489
Duval	131	Live Oak	297	Wilson	493
Fort Bend	157	Matagorda	321	Zapata	505
Frio	163	Maverick	323	Zavala	507
Galveston	167	McMullen	311		

UNIT 5

Bandera	019	Edwards	137	Medina	325
Bell	027	Erath	143	Menard	327
Bexar	029	Gillespie	171	Mills	333
Blanco	031	Hamilton	193	Palo Pinto	363
Bosque	035	Hays	209	Real	385
Brown	049	Hood	221	Runnels	399
Burnet	053	Kendall	259	San Saba	411
Callahan	059	Kerr	265	Schleicher	413
Coleman	083	Kimble	267	Somervell	425
Comal	091	Kinney	271	Stephens	429
Comanche	093	Lampasas	281	Sutton	435
Concho	095	Llano	299	Travis	453
Coryell	099	Mason	319	Uvalde	463
Crockett	105	McCulloch	307	Val Verde	465
Eastland	133	McLennan	309	Williamson	491

UNIT 6

Andrews	003	Glasscock	173	Motley	345
Archer	009	Gray	179	Nolan	353
Armstrong	011	Hale	189	Ochiltree	357
Bailey	017	Hall	191	Oldham	359
Baylor	023	Hansford	195	Parmer	369
Borden	033	Hardeman	197	Potter	375
Briscoe	045	Hartley	205	Randall	381
Carson	065	Haskell	207	Reagan	383
Castro	069	Hemphill	211	Roberts	393
Childress	075	Hockley	219	Scurry	415
Cochran	079	Howard	227	Shackelford	417
Coke	081	Hutchinson	233	Sherman	421
Collingsworth	087	Irion	235	Sterling	431
Cottle	101	Jones	253	Stonewall	433
Crosby	107	Kent	263	Swisher	437
Dallam	111	King	269	Taylor	441
Dawson	115	Knox	275	Terry	445
Deaf Smith	117	Lamb	279	Throckmorton	447
Dickens	125	Lipscomb	295	Tom Green	451
Donley	129	Lubbock	303	Wheeler	483
Fisher	151	Lynn	305	Wichita	485
Floyd	153	Martin	317	Wilbarger	487
Foard	155	Midland	329	Yoakum	501
Gaines	165	Mitchell	335		
Garza	169	Moore	341		

UNIT 7

Brewster	043	Hudspeth	229	Reeves	389
Crane	103	Jeff Davis	243	Terrell	443
Culberson	109	Loving	301	Upton	461
Ector	135	Pecos	371	Ward	475
El Paso	141	Presidio	377	Winkler	495

VIRGINIA - 51

UNIT 1 COASTAL PLAIN

Accomack	001	Henrico	087	Northampton	131
Brunswick	025	Isle of Wight	093	Northumberland	133
Caroline	033	James City	095	Prince George	149
Charles City	036	King and Queen	097	Richmond	159
Chesapeake City	550	King George	099	Southampton	175
Chesterfield	041	King William	101	Suffolk City	800
Dinwiddie	053	Lancaster	103	Surry	181
Essex	057	Mathews	115	Sussex	183
Gloucester	073	Middlesex	119	Virginia Beach City	810
Greensville	081	New Kent	127	Hampton City	650
Newport News City	700	Westmoreland	193	York	199
Hanover	085				

UNIT 2 SOUTHERN PIEDMONT

Amelia	007	Cumberland	049	Nottoway	135
Appomattox	011	Franklin	067	Patrick	141
Bedford	019	Halifax	083	Pittsylvania	143
Buckingham	029	Henry	089	Powhatan	145
Campbell	031	Lunenburg	111	Prince Edward	147
Charlotte	037	Mecklenburg	117		

UNIT 3 NORTHERN PIEDMONT

Albemarle	003	Fluvanna	065	Nelson	125
Amherst	009	Goochland	075	Orange	137
Arlington	013	Greene	079	Prince William	153
Culpeper	047	Loudoun	107	Rappahannock	157
Fairfax	059	Louisa	109	Spotsylvania	177
Fauquier	061	Madison	113	Stafford	179

UNIT 4 NORTHERN MOUNTAINS

Alleghany	005	Craig	045	Rockbridge	163
Augusta	015	Frederick	069	Rockingham	165
Bath	017	Highland	091	Shenandoah	171
Botetourt	023	Page	139	Warren	187
Clarke	043	Roanoke	161		

UNIT 5 SOUTHERN MOUNTAINS

Bland	021	Grayson	077	Smyth	173
Buchanan	027	Lee	105	Tazewell	185
Carroll	035	Montgomery	121	Washington	191
Dickenson	051	Pulaski	155	Wise	195
Floyd	063	Russell	167	Wythe	197
Giles	071	Scott	169		

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.

East	West	Code	Species Type
			White / Red / Jack Pine Group
E		101	Jack pine
E		102	Red pine
E		103	Eastern white pine
E		104	Eastern white pine / eastern hemlock
E		105	Eastern hemlock
			Spruce / Fir Group
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
			Longleaf / Slash Pine Group
E		141	Longleaf pine
E		142	Slash pine
			Tropical Softwoods Group
E		151	Tropical pines
			Loblolly / Shortleaf Pine Group
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
			Other Eastern Softwoods Group
E		171	Eastern redcedar
E		172	Florida softwoods
			Pinyon / Juniper Group
E	W	182	Rocky Mountain juniper
E	W	184	Juniper woodland
E	W	185	Pinyon-juniper woodland
			Douglas-fir Group
E	W	201	Douglas-fir
	W	202	Port-Orford-cedar
	W	203	Bigcone Douglas-fir
			Ponderosa Pine Group
E	W	221	Ponderosa pine

East	West	Code	Species Type
	W	222	Incense-cedar
	W	224	Sugar pine
	W	225	Jeffrey pine
	W	226	Coulter pine
			Western White Pine Group
	W	241	Western white pine
			Fir / Spruce / Mountain Hemlock Group
	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
			Lodgepole Pine Group
	W	281	Lodgepole pine
			Hemlock / Sitka Spruce Group
	W	301	Western hemlock
	W	304	Western redcedar
	W	305	Sitka spruce
			Western Larch Group
	W	321	Western larch
			Redwood Group
	W	341	Redwood
	W	342	Giant sequoia
			Other Western Softwoods Group
	W	361	Knobcone pine
	W	362	Southwestern white pine
	W	363	Bishop pine
	W	364	Monterey pine
	W	365	Foxtail pine / bristlecone pine
	W	366	Limber pine
	W	367	Whitebark pine
	W	368	Misc. western softwoods
	W	369	Western juniper
			California Mixed Conifer Group
	W	371	California mixed conifer
			Exotic Softwoods Group
E		381	Scotch pine
E	W	383	Other exotic softwoods
E		384	Norway spruce
E		385	Introduced larch
			Other Softwoods Group
		391	Other softwoods

East	West	Code	Species Type
			Oak / Pine Group
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
			Oak / Hickory Group
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
			Oak / Gum / Cypress Group
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
			Elm / Ash / Cottonwood Group
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
			Maple / Beech / Birch Group
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
			Aspen / Birch Group
E	W	901	Aspen
E	W	902	Paper birch
E		903	Gray birch
E	W	904	Balsam poplar
E	W	905	Pin cherry
			Alder / Maple Group
	W	911	Red alder
	W	912	Bigleaf maple
			Western Oak Group
	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)
			Tanoak / Laurel Group
	W	941	Tanoak
	W	942	California laurel
	W	943	Giant chinkapin
			Other Harwoods Group
	W	961	Pacific madrone
	W	962	Other hardwoods
			Woodland Hardwoods Group
	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
			Tropical Hardwoods Group
E		982	Mangrove
E	W	983	Palms
E		989	Other tropical hardwoods
			Exotic Hardwoods Group
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), 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 torreya): 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, 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.

LODGEPOLE 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 torreya, 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 torreya.

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 baldcyrpess 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, Allegany 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 bustic, 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.

SUPPLEMENTAL CARIBBEAN FOREST TYPES -- TROPICAL HARDWOODS GROUP

984 – Dry forest (*FGDC – Lowland to Submontane Drought Deciduous, Semi-deciduous and Semi-evergreen Forest; Holdridge life zone - Subtropical Dry Forest)*

Associates - *Bursera simaruba* (L.) Sarg., *Bucida buceras* L., *Cephalocereus royenii* (L.) Britton, and *Guaiacum officinale* L. are species commonly associated with Puerto Rican dry forest. The more heavily-disturbed dry forest areas have numerous, smaller stemmed *Leucaena leucocephala* (Lam.) deWit, *Prosopis juliflora* (Sw.) DC., *Acacia macracantha* Humb. & Bonpl. and *Acacia farnesiana* (L.) Willd. individuals. Some of the native tree species that are common in subtropical dry forest in the U.S. Virgin Islands are *Bursera simaruba* (L.) Sarg., *Amyris elemifera* L.*, Capparis cynophallophora* L.*, Cordia rickseckeri* Millsp.*, Pisonia subcordata* Sw.*, Guaiacum officinale* L.*, Plumeria alba* L.*,* and *Pictetia aculeata* (Vahl) Urban. The more heavily-disturbed dry forest areas have numerous, smaller stemmed *Leucaena leucocephala* (Lam.) deWit, *Prosopis juliflora* (Sw.) DC., *Acacia macracantha* Humb. & Bonpl., and *Acacia farnesiana* (L.) Willd. individuals

985 - Moist forest *(FGDC – Lowland and Submontane Seasonal Evergreen; Holdridge life zone – Subtropical Moist Forest)*

Associates -- In the Caribbean, subtropical moist forests are found in areas with 1000 to 2200 mm of annual precipitation. The subtropical moist life zone is the most extensive on Puerto Rico and covers a wide variety of soil parent materials, topographic classes and land uses resulting in highly diverse mixes that typically include *Tabebuia heterophylla* (DC.) Britton, *Spathodea campanulata* Beauv., *Guarea guidonia* (L.) Sleumer, *Andira inermis* (W. Wright) Kunth ex DC., *Roystonea borinquena* O. F. Cook, *Mangifera indica* L., *Cecropia peltata* L., *Schefflera morototonii* (Aubl.) Maguire, Steyermark and species of the *Nectandra*, *Ocotea*, and *Coccoloba* genera. Some of the many natural indicator species of subtropical moist forest in the U.S. Virgin Islands include the *Andira inermis* (W. Wright) Kunth ex DC., *Guapira fragrans* (Dum.-Cours.) Little, *Spondias mombin* L., *Bucida buceras* L., *Hura crepitans* L., *Ceiba pentandra* (L.) Gaertn., *Cedrela odorata* L., *Pimenta racemosa var. racemosa*, *Roystonea borinquena* O.F. Cook (on St. Croix only), *Hymanaea courbaril* L., *Cecropia schreberiana* Miq., and *Tabebuia heterophylla* (DC.) Britt.. While subtropical moist forests have some of the same introduced species found in subtropical dry forest, *Tamarindus indica* L. and *Melicoccus bijugatus* Jacq. are also common.

986 - Wet and rain forest *(FGDC – Submontane Evergreen Forest; Holdridge life zone – Subtropical Wet and Rain Forest)*

Associates -- In the Caribbean, subtropical wet and rain forests are found in areas with 2000 to 4000 mm of annual precipitation. *Dacryodes excelsa* Vahl., *Sloanea berteriana* Choisy, *Manilkara bidentata* (A.DC.) are species indicative of the tabonuco forest type. *Cecropia peltata* L., *Schefflera morototonii* (Aubl.) Maguire and *Ochroma lagopus* Sw. are also common in wet forest stands at early stages of succession or recovery from disturbance. Wet forest shade coffee plantations hold species such as *Guarea guidonia* (L.) Sleumer, *Inga laurina* (Sw.) Willd., *Inga vera* Willd., and *Erythrina poeppigiana* (Walp.) O.F. Cook.

987 - Lower montane rainforest *(FGDC – Montane Evergreen Forest; Holdridge life zone – Lower Montane Wet and Rain Forest)*

Associates -- In the Caribbean, lower montane wet and rain forests are found in areas with elevations between 700-1000 meters. Forest types and their typical species include the palo colorado forest type (*Cyrilla racemiflora* L., *Ocotea spathulata* Mez., *Micropholis guyanensis (A. DC.) Pierre* and *Micropholis garciniifolia* Pierre), elfin forest type (*Eugenia borinquensis* Britton, *Tabebuia rigida* Urban, *Weinmannia pinnata* L. and *Calycogonium squamulosum* Cogn.) and the palm brake forest type (*Prestoea montana* (Graham) Nichols.).

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	Carib-bean	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		C	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

Core	East	West	Wood-land	Carib-bean	FIA Code	PLANTS Code	Common Name	Genus	Species
X		W			0093	PIEN	Engelmann spruce	Picea	Engelmannii
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		C	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	Attenuate
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	Radiate
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	PIVI2	Virginia pine	Pinus	virginiana
X		W	w		0133	PIMO	singleleaf pinyon	Pinus	monophylla
X		W	w		0134	PIDI3	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

Core	East	West	Wood-land	Carib-bean	FIA Code	PLANTS Code	Common Name	Genus	Species
X	E				0144	PIELE2	Carribean pine	Pinus	elliottii var. elliottii
		W			0200	PSEUD7	Douglas-fir spp.	Pseudotsuga	spp.
X		W			0201	PSMA	bigcone Douglas-fir	Pseudotsuga	macrocarpa
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	pondcypress	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	TAFL	Florida yew	Taxus	floridana
	E	W		C	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		C	0299	2TE	unknown dead conifer	Tree	evergreen
	E	W	w	C	0300	ACACI	acacia spp.	Acacia	spp.
	E	W		C	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	ACNI5	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	AEGL	Ohio buckeye	Aesculus	glabra
X	E				0332	AEFL	yellow buckeye	Aesculus	flava
		W			0333	AECA	California buckeye	Aesculus	californica
	E				0334	AEGLA	Texas buckeye	Aesculus	glabra var. arguta
	E				0336	AEPA	red buckeye	Aesculus	pavia
X	E				0337	AESY	painted buckeye	Aesculus	sylvatica
X	E				0341	AIAL	ailanthus	Ailanthus	altissima
X	E	W			0345	ALJU	mimosa/silktree	Albizia	julibrissin
		W			0350	ALNUS	alder spp.	Alnus	spp.

Core	East	West	Wood-land	Carib-bean	FIA Code	PLANTS Code	Common Name	Genus	Species
X		W			0351	ALRU2	red alder	Alnus	rubra
X		W			0352	ALRH2	white alder	Alnus	rhombifolia
X		W			0353	ALOB2	Arizona alder	Alnus	oblongifolia
X	E				0355	ALGL2	European alder	Alnus	glutinosa
	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	illinoinensis
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			C	0450	CATAL	catalpa spp.	Catalpa	spp.
X	E				0451	CABI8	southern catalpa	Catalpa	bignonioides
X	E				0452	CASP8	northern catalpa	Catalpa	speciosa
	E	W		C	0460	CELTI	hackberry spp.	Celtis	spp.
X	E	W			0461	CELA	sugarberry	Celtis	laevigata
X	E	W			0462	CEOC	hackberry	Celtis	occidentalis
	E	W			0463	CELAR	netleaf hackberry	Celtis	laevigata var. reticulata
X	E				0471	CECA4	eastern redbud	Cercis	canadensis

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		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
	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		C	0510	EUCAL	eucalyptus spp.	Eucalyptus	spp.
X		W			0511	EUGL	Tasmanian bluegum	Eucalyptus	globulus
X	E				0512	EUCA2	river redgum	Eucalyptus	camaldulensis
X	E			C	0513	EUGR12	grand eucalyptus	Eucalyptus	grandis
X	E			C	0514	EURO2	swamp mahogany	Eucalyptus	robusta
	E			C	0520	DIOSP	persimmon spp.	Diospyros	spp.
X	E				0521	DIVI5	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		C	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		C	0600	JUGLA	walnut spp.	Juglans	spp.
X	E				0601	JUCI	butternut	Juglans	cinerea

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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
X	E				0621	LITU	yellow-poplar	Liriodendron	tulipifera
X		W			0631	LIDE3	tanoak	Lithocarpus	densiflorus
X	E				0641	MAPO	Osage-orange	Maclura	pomifera
	E			C	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			C	0680	MORUS	mulberry spp.	Morus	spp.
X	E			C	0681	MOAL	white mulberry	Morus	alba
X	E				0682	MORU2	red mulberry	Morus	rubra
	E	W			0683	MOMI	Texas mulberry	Morus	microphylla
X	E			C	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		C	0720	PERSE	bay spp.	Persea	spp.
X	E				0721	PEBO	redbay	Persea	borbonia
X		W		C	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

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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	C	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
X	E	W	w		0758	PRPU	screwbean mesquite	Prosopis	pubescens
	E	W		C	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

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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
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	margarettiae
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
	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			C	0852	AMEL	torchwood	Amyris	elemifera
	E			C	0853	ANGL4	pond apple	Annona	glabra
	E			C	0854	BUSI	gumbo limbo	Bursera	simaruba
	E			C	0855	CASUA	sheoak spp.	Casuarina	spp.
X	E			C	0856	CAGL11	gray sheoak	Casuarina	glauca
X	E			C	0857	CALE28	Australian pine	Casuarina	lepidophloia
	E			C	0858	CICA	camphor tree	Cinnamomum	camphora
	E				0859	CIFR	fiddlewood	Citharexylum	fruticosum
	E			C	0860	CITRU2	citrus spp.	Citrus	spp.
	E			C	0863	CODI8	pigeon plum, tietongue	Coccoloba	diversifolia
	E			C	0864	COEL2	soldierwood	Colubrina	elliptica
	E			C	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			C	0873	EURH	red stopper	Eugenia	rhombea
	E			C	0874	EXPA	Inkwood, butterbough	Exothea	paniculata
	E				0876	FIAU	strangler fig	Ficus	aurea
	E			C	0877	FICI	shortleaf fig, wild banyantree	Ficus	citrifolia
	E			C	0882	GUDI	Blolly, beeftree	Guapira	discolor
	E			C	0883	HIMA2	manchineel	Hippomane	mancinella

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	E			C	0884	LYLA3	false tamarind	Lysiloma	latisiliquum
	E			C	0885	MAIN3	mango	Mangifera	indica
	E			C	0886	METO3	poisonwood	Metopium	toxiferum
	E				0887	PIPI3	fishpoison tree	Piscidia	piscipula
	E			C	0888	SCAC2	schefflera, octopus tree	Schefflera	actinophylla
	E			C	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			C	0897	TAIN2	tamarind	Tamarindus	indica
X	E	W			0901	ROPS	black locust	Robinia	pseudoacacia
		W	w		0902	RONE	New Mexico locust	Robinia	neomexicana
	E				0906	ACWR4	paurotis palm	Acoelorraphe	wrightii
	E				0907	COAR	silver palm	Coccothrinax	argentata
	E			C	0908	CONU	coconut palm	Cocos	nucifera
	E			C	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			C	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		C	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

Core	East	West	Wood-land	Carib-bean	FIA Code	PLANTS Code	Common Name	Genus	Species
		W			0982	YUBR	Joshua tree	Yucca	brevifolia
	E			C	0986	AVGE	black mangrove	Avicennia	germinans
	E			C	0987	COER2	buttonwood mangrove	Conocarpus	erectus
	E			C	0988	LARA2	white mangrove	Laguncularia	racemosa
X	E			C	0989	RHMA2	American (red) mangrove	Rhizophora	mangle
		W	w		0990	OLTE	desert ironwood	Olneya	tesota
	E	W		C	0991	TAMAR2	saltcedar	Tamarix	spp.
X	E			C	0992	MEQU	melaleuca	Melaleuca	quinquenervia
X	E			C	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
	E	W			0997	ELAN	Russian-olive	Elaeagnus	angustifolia
X	E	W		C	0998	2TB	unknown dead hardwood	Tree	broadleaf
X	E	W		C	0999	2TREE	other, or unknown live tree	Tree	unknown

SUPPLEMENTAL CARIBBEAN TREE SPECIES (5.36 SRS CARIBBEAN SPECIES)

SRS Note: If the supplemental Caribbean species are not required for your state, these pages may be removed from your copy of the field guide.

Core	East	West	Wood-land	Carib-bean	FIA Code	PLANTS Code	Common Name	Genus	Species
	E			C	6001	ACAN4	blackbrush wattle	Acacia	anegadensis
	E			C	6008	ACMA	porknut	Acacia	macracantha
	E			C	6009	ACMA12	Acacia mangium	Acacia	mangium
	E			C	6012	ACMU	spineless wattle	Acacia	muricata
	E			C	6013	ACNI2	gum arabic tree	Acacia	nilotica
	E			C	6015	ACPO3	Acacia polyacantha	Acacia	polyacantha
	E			C	6018	ACTO	poponax	Acacia	tortuosa
	E			C	6021	ACAR	hollowheart	Acnistus	arborescens
	E			C	6023	ACME2	grugru palm	Acrocomia	media
	E			C	6025	ADDI3	baobab	Adansonia	digitata
	E			C	6026	ADRI	wild lime	Adelia	ricinella
	E			C	6028	ADPA	red beadtree	Adenanthera	pavonina
	E			C	6032	AEMA	Caribbean spiritweed	Aegiphila	martinicensis
	E			C	6036	AGAU4	kauri	Agathis	australis
	E			C	6037	AGRO6	Queensland kauri	Agathis	robusta
	E			C	6053	AIMI	Aiphanes minima	Aiphanes	minima
	E			C	6055	ALAD	cream albizia	Albizia	adinocephala
	E			C	6056	ALCA8	naked albizia	Albizia	carbonaria
	E			C	6059	ALLE	woman's tongue	Albizia	lebbeck
	E			C	6060	ALPR	tall albizia	Albizia	procera
	E			C	6064	ALLA	achiotillo	Alchornea	latifolia
	E			C	6066	ALFL3	palo de gallina	Alchorneopsis	floribunda
	E			C	6075	ALMO2	Indian walnut	Aleurites	moluccana
	E			C	6080	ALCR9	palo blanco	Allophylus	crassinervis
	E			C	6082	ALRA	palo de caja	Allophylus	racemosus
	E			C	6092	ALBR4	helecho gigante de la sierra	Alsophila	bryophila
	E			C	6093	ALPO7	Alsophila portoricensis	Alsophila	portoricensis
	E			C	6101	AMLA4	black calabash	Amphitecna	latifolia
	E			C	6103	AMBA2	balsam torchwood	Amyris	balsamifera
	E			C	6106	ANACA	anacardium	Anacardium	spp.

Core	East	West	Wood-land	Carib-bean	FIA Code	PLANTS Code	Common Name	Genus	Species
	E			C	6107	ANOC	cashew	Anacardium	occidentale
	E			C	6111	ANPE13	Anadenanthera peregrina	Anadenanthera	peregrina
	E			C	6114	ANIN	cabbagebark tree	Andira	inermis
	E			C	6120	ANBR7	canelillo	Aniba	bracteata
	E			C	6124	ANCH9	Annona cherimola	Annona	cherimola
	E			C	6125	ANDI11	ilama	Annona	diversifolia
	E			C	6127	ANMO	mountain soursop	Annona	montana
	E			C	6128	ANMU2	soursop	Annona	muricata
	E			C	6129	ANRE	custard apple	Annona	reticulata
	E			C	6131	ANSQ	sugar apple	Annona	squamosa
	E			C	6137	ANBU3	Antidesma bunius	Antidesma	bunius
	E			C	6146	ANAC4	placa chiquitu	Antirhea	acutata
	E			C	6147	ANCO3	pegwood	Antirhea	coriacea
	E			C	6149	ANLU3	palo iloron	Antirhea	lucida
	E			C	6150	ANOB2	quina roja	Antirhea	obtusifolia
	E			C	6151	ANPO3	Puerto Rico quina	Antirhea	portoricensis
	E			C	6152	ANSI	Sintenis' quina	Antirhea	sintenisii
	E			C	6154	ARAN15	parana pine	Araucaria	angustifolia
	E			C	6157	ARHE12	Norfolk Island pine	Araucaria	heterophylla
	E			C	6162	ARGL11	ausubon	Ardisia	glauciflora
	E			C	6163	ARLU3	mountain marlberry	Ardisia	luquillensis
	E			C	6164	AROB2	Guadeloupe marlberry	Ardisia	obovata
	E			C	6165	ARSO	China-shrub	Ardisia	solanacea
	E			C	6171	ARAL7	breadfruit	Artocarpus	altilis
	E			C	6173	ARHE2	Artocarpus heterophyllus	Artocarpus	heterophyllus
	E			C	6198	AVCA	carambola	Averrhoa	carambola
	E			C	6206	AZIN2	neem	Azadirachta	indica
	E			C	6216	BAVU2	common bamboo	Bambusa	vulgaris
	E			C	6217	BAPO	Puerto Rico palo de ramon	Banara	portoricensis
	E			C	6219	BAVA2	Vanderbilt's palo de ramon	Banara	vanderbiltii
	E			C	6220	BAAS3	sea putat	Barringtonia	asiatica
	E			C	6224	BAEG6	Bastardiopsis eggersii	Bastardiopsis	eggersii
	E			C	6226	BAMO2	Napoleon's plume	Bauhinia	monandra
	E			C	6227	BAMU3	petite flamboyant bauhinia	Bauhinia	multinervia
	E			C	6228	BAPA3	railroadfence	Bauhinia	pauletia
	E			C	6229	BAPU	butterfly tree	Bauhinia	purpurea
	E			C	6231	BATO	St. Thomas tree	Bauhinia	tomentosa
	E			C	6232	BAVA	mountain ebony	Bauhinia	variegata
	E			C	6233	BEPE	slugwood	Beilschmiedia	pendula
	E			C	6235	BEDI2	Caribbean myrtlecroton	Bernardia	dichotoma
	E			C	6238	BIOR	lipsticktree	Bixa	orellana
	E			C	6240	BLSA2	akee	Blighia	sapida
	E			C	6247	BOFR2	parrotweed	Bocconia	frutescens
	E			C	6251	BODA	white alling	Bontia	daphnoides
	E			C	6253	BORA2	Bourreria radula	Bourreria	radula
	E			C	6255	BOSU2	bodywood	Bourreria	succulenta
	E			C	6257	BOVI2	roble de guayo	Bourreria	virgata
	E			C	6270	BRCO6	West Indian sumac	Brunellia	comocladiifolia
	E			C	6272	BRAM4	American brunfelsia	Brunfelsia	americana
	E			C	6273	BRDE4	Serpentine Hill raintree	Brunfelsia	densifolia
	E			C	6274	BRLA5	vega blanca	Brunfelsia	lactea
	E			C	6275	BRPO3	Puerto Rico raintree	Brunfelsia	portoricensis

Core	East	West	Wood-land	Carib-bean	FIA Code	PLANTS Code	Common Name	Genus	Species
	E			C	6283	BUTE4	fourleaf buchenavia	Buchenavia	tetraphylla
	E			C	6284	BUBU	gregorywood	Bucida	buceras
	E			C	6294	BUGL2	cafe falso	Bunchosia	glandulifera
	E			C	6295	BUGL	cafe forastero	Bunchosia	glandulosa
	E			C	6297	BUPO5	Bunchosia polystachia	Bunchosia	polystachia
	E			C	6303	BULA10	Buxus laevigata	Buxus	laevigata
	E			C	6304	BUPO	Puerto Rico box	Buxus	portoricensis
	E			C	6306	BUVA	Vahl's box	Buxus	vahlii
	E			C	6308	BYCR	maricao cimun	Byrsonima	crassifolia
	E			C	6311	BYLU	Long Key locustberry	Byrsonima	lucida
	E			C	6313	BYSP	doncella	Byrsonima	spicata
	E			C	6315	BYWA	almendrillo	Byrsonima	wadsworthii
	E			C	6316	CAESA	nicker	Caesalpinia	spp.
	E			C	6317	CACO28	divi divi	Caesalpinia	coriaria
	E			C	6319	CAPU13	pride-of-Barbados	Caesalpinia	pulcherrima
	E			C	6320	CASA28	sappanwood	Caesalpinia	sappan
	E			C	6325	CASU33	Surinamese stickpea	Calliandra	surinamensis
	E			C	6326	CAAM14	caparosa	Callicarpa	ampla
	E			C	6328	CACI15	crimson bottlebrush	Callistemon	citrinus
	E			C	6331	CACO2	Callitris columellaris	Callitris	columellaris
	E			C	6337	CAEC2	Caloncoba echinata	Caloncoba	echinata
	E			C	6338	CAAN22	Antilles calophyllum	Calophyllum	antillanum
	E			C	6341	CAIN4	Alexandrian laurel	Calophyllum	inophyllum
	E			C	6346	CAPR	roostertree	Calotropis	procera
	E			C	6350	CACA73	degame	Calycophyllum	candidissimum
	E			C	6351	CAKI	Kiaerskov's lidflower	Calyptranthes	kiaerskovii
	E			C	6352	CAKR	limoncillo	Calyptranthes	krugii
	E			C	6353	CALU12	Luquillo forest lidflower	Calyptranthes	luquillensis
	E			C	6354	CAPA8	pale lidflower	Calyptranthes	pallens
	E			C	6355	CAPO9	Puerto Rico lidflower	Calyptranthes	portoricensis
	E			C	6356	CASI8	limoncillo de monte	Calyptranthes	sintenisii
	E			C	6358	CATH3	Thomas' lidflower	Calyptranthes	thomasiana
	E			C	6359	CAZU	myrtle of the river	Calyptranthes	zuzygium
	E			C	6360	CARI3	Puerto Rico manac	Calyptronoma	rivalis
	E			C	6370	CAOD	ilang-ilang	Cananga	odorata
	E			C	6380	CAWI	wild cinnamon	Canella	winteriana
	E			C	6383	CAAM13	burro blanco	Capparis	amplissima
	E			C	6384	CABA2	caper	Capparis	baducca
	E			C	6386	CACY	Jamaican caper	Capparis	cynophallophora
	E			C	6387	CAFL2	falseteeth	Capparis	flexuosa
	E			C	6389	CAHA9	broadleaf caper	Capparis	hastata
	E			C	6390	CAIN5	linguam	Capparis	indica
	E			C	6393	CAGU6	crabwood	Carapa	guianensis
	E			C	6395	CAPA23	papaya	Carica	papaya
	E			C	6402	CAAC3	rabo de ranton	Casearia	aculeata
	E			C	6403	CAAR8	gia verde	Casearia	arborea
	E			C	6406	CADE11	wild honeytree	Casearia	decandra
	E			C	6407	CAGU2	Guyanese wild coffee	Casearia	guianensis
	E			C	6410	CASY2	crackopen	Casearia	sylvestris
	E			C	6415	CAFI3	golden shower	Cassia	fistula
	E			C	6417	CAGR11	pink shower	Cassia	grandis
	E			C	6418	CAJA3	apple blossom	Cassia	javanica

Core	East	West	Wood-land	Carib-bean	FIA Code	PLANTS Code	Common Name	Genus	Species
	E			C	6425	CAXY	marbletree	Cassine	xylocarpa
	E			C	6427	CAGU3	goatwood	Cassipourea	guianensis
	E			C	6429	CAER3	goatbush	Castela	erecta
	E			C	6430	CAEL5	Panama rubbertree	Castilla	elastica
	E			C	6433	CACU8	river sheoak	Casuarina	cunninghamiana
	E			C	6434	CAEQ	beach sheoak	Casuarina	equisetifolia
	E			C	6439	CALO8	Haitian catalpa	Catalpa	longissima
	E			C	6443	CESC9	pumpwood	Cecropia	schreberiana
	E			C	6445	CEOD	Spanish cedar	Cedrela	odorata
	E			C	6447	CEAC4	pochote	Ceiba	acuminata
	E			C	6448	CEAE2	pochote	Ceiba	aesculifolia
	E			C	6449	CEPE2	kapoktree	Ceiba	pentandra
	E			C	6454	CETR3	almex	Celtis	trinervia
	E			C	6457	CESI3	St. John's bread	Ceratonia	siliqua
	E			C	6468	CEHE3	lady of the night cactus	Cereus	hexagonus
	E			C	6469	CEHI3	Cereus hildmannianus	Cereus	hildmannianus
	E			C	6474	CEDI6	day jessamine	Cestrum	diurnum
	E			C	6475	CELA2	galen del monte	Cestrum	laurifolium
	E			C	6477	CENO	night jessamine	Cestrum	nocturnum
	E			C	6481	CHAR8	jointed sandmat	Chamaesyce	articulata
	E			C	6519	CHAX2	hueso	Chionanthus	axilliflorus
	E			C	6520	CHCO12	bridgotree	Chionanthus	compactus
	E			C	6521	CHDO4	white rosewood	Chionanthus	domingensis
	E			C	6522	CHHO4	hueso prieto	Chionanthus	holdridgei
	E			C	6523	CHLI6	cabra blanca	Chionanthus	ligustrinus
	E			C	6526	CHSE5	puntaj jayuya	Chione	seminervis
	E			C	6528	CHVE4	fatpork	Chione	venosa
	E			C	6529	CHEX5	african teak	Chlorophora	excelsa
	E			C	6532	CHSP13	silk-floss tree	Chorisia	speciosa
	E			C	6535	CHIC	icaco coco plum	Chrysobalanus	icaco
	E			C	6539	CHAR6	bastard redwood	Chrysophyllum	argenteum
	E			C	6541	CHCA10	star apple	Chrysophyllum	cainito
	E			C	6542	CHOL	satinleaf	Chrysophyllum	oliviforme
	E			C	6543	CHPA31	camito de perro	Chrysophyllum	pauciflorum
	E			C	6554	CIAR8	cassia	Cinnamomum	aromaticum
	E			C	6559	CIEL2	laurel avispillo	Cinnamomum	elongatum
	E			C	6560	CIMO3	avispillo	Cinnamomum	montanum
	E			C	6564	CIVE2	cinnamon	Cinnamomum	verum
	E			C	6565	CICA8	juniper berry	Citharexylum	caudatum
	E			C	6567	CISP3	spiny fiddlewood	Citharexylum	spinosum
	E			C	6569	CITR7	threespike fiddlewood	Citharexylum	tristachyum
	E			C	6573	CIAU7	grapefruit	Citrus	×aurantiifolia
	E			C	6574	CIAU8	Citrus ×aurantium	Citrus	×aurantium
	E			C	6575	CILI5	shaddock	Citrus	×limon
	E			C	6576	CIPA3	citron	Citrus	×paradisi
	E			C	6577	CISI3	tangerine	Citrus	×sinensis
	E			C	6581	CIMA5	Citrus maxima	Citrus	maxima
	E			C	6582	CIME3	Citrus medica	Citrus	medica
	E			C	6584	CIRE3	Citrus reticulata	Citrus	reticulata
	E			C	6631	CLAC2	haggarbush	Clerodendrum	aculeatum
	E			C	6637	CLAL4	teta prieta	Cleyera	albopunctata
	E			C	6639	CLER	jackass breadnut	Clibadium	erosum

Core	East	West	Wood-land	Carib-bean	FIA Code	PLANTS Code	Common Name	Genus	Species
	E			C	6641	CLCY5	Clidemia cymosa	Clidemia	cymosa
	E			C	6642	CLHI3	soapbush	Clidemia	hirta
	E			C	6644	CLFA5	Philippine pigeonwings	Clitoria	fairchildiana
	E			C	6646	CLCL2	cupeillo	Clusia	clusioides
	E			C	6648	CLGU	Grundlach's attorney	Clusia	gundlachii
	E			C	6650	CLMI2	cupey de monte	Clusia	minor
	E			C	6651	CLRO	Scotch attorney	Clusia	rosea
	E			C	6653	CNHO	deepwoods fern	Cnemidaria	horrida
	E			C	6655	CNAC	treadsoftly	Cnidoscolus	aconitifolius
	E			C	6658	COCO8	uvilla	Coccoloba	costata
	E			C	6660	COKR	whitewood	Coccoloba	krugii
	E			C	6661	COMI	puckhout	Coccoloba	microstachya
	E			C	6662	COPA24	pale seagrape	Coccoloba	pallida
	E			C	6663	COPU	grandleaf seagrape	Coccoloba	pubescens
	E			C	6664	COPY	uvera	Coccoloba	pyrifolia
	E			C	6665	CORU4	ortegon	Coccoloba	rugosa
	E			C	6666	COSI2	uvero de monte	Coccoloba	sintenisii
	E			C	6668	COSW	Swartz's pigeonplum	Coccoloba	swartzii
	E			C	6669	COTE9	Bahama pigeonplum	Coccoloba	tenuifolia
	E			C	6670	COUV	seagrape	Coccoloba	uvifera
	E			C	6671	COVE	false chiggergrape	Coccoloba	venosa
	E			C	6673	COBA3	Coccothrinax barbadensis	Coccothrinax	barbadensis
	E			C	6679	COVI	silk cottontree	Cochlospermum	vitifolium
	E			C	6683	COVA3	garden croton	Codiaeum	variegatum
	E			C	6684	COAR2	Arabian coffee	Coffea	arabica
	E			C	6686	COLI8	Coffea liberica	Coffea	liberica
	E			C	6688	COAR9	Cojoba arborea	Cojoba	arborea
	E			C	6689	COAC4	abata cola	Cola	acuminata
	E			C	6693	COAR3	greenheart	Colubrina	arborescens
	E			C	6700	COVE6	Urban's nakedwood	Colubrina	verrucosa
	E			C	6705	CODO	poison ash	Comocladia	dodonaea
	E			C	6706	COGL4	carrasco	Comocladia	glabra
	E			C	6710	CORU17	Luquillo Mountain snailwood	Conostegia	rufescens
	E			C	6711	COMO8	Consolea moniliformis	Consolea	moniliformis
	E			C	6712	CORU8	Consolea rubescens	Consolea	rubescens
	E			C	6714	COOF2	copaiba	Copaifera	officinalis
	E			C	6728	COAL	Spanish elm	Cordia	alliodora
	E			C	6730	COBO3	muneco	Cordia	borinquensis
	E			C	6731	COCO5	red manjack	Cordia	collococca
	E			C	6735	COLA12	smooth manjack	Cordia	laevigata
	E			C	6737	COOB3	clammy cherry	Cordia	obliqua
	E			C	6738	CORI	San Bartolome	Cordia	rickseckeri
	E			C	6739	CORU5	Puerto Rico manjack	Cordia	rupicola
	E			C	6743	COSU3	mucilage manjack	Cordia	sulcata
	E			C	6746	COOB4	nigua	Cornutia	obovata
	E			C	6747	COPY2	azulejo	Cornutia	pyramidata
	E			C	6750	COCI4	Corymbia citriodora	Corymbia	citriodora
	E			C	6756	COGU3	cannonball tree	Couroupita	guianensis
	E			C	6761	CRCU	common calabash tree	Crescentia	cujete
	E			C	6762	CRLI5	higuerito	Crescentia	linearifolia
	E			C	6763	CRPO6	higuero de sierra	Crescentia	portoricensis
	E			C	6765	CRPO7	Critonia portoricensis	Critonia	portoricensis

Core	East	West	Wood-land	Carib-bean	FIA Code	PLANTS Code	Common Name	Genus	Species
	E			C	6767	CRRH	maidenberry	Crossopetalum	rhacoma
	E			C	6773	CRAS3	wild marrow	Croton	astroites
	E			C	6774	CRFL23	Croton flavens	Croton	flavens
	E			C	6775	CRPO4	sabinon	Croton	poecilanthus
	E			C	6786	CRJA3	Japanese cedar	Cryptomeria	japonica
	E			C	6788	CULA	Chinese fir	Cunninghamia	lanceolata
	E			C	6790	CUAM	wild ackee	Cupania	americana
	E			C	6792	CUTR	guara blanca	Cupania	triquetra
	E			C	6795	CULU2	cedar-of-Goa	Cupressus	lusitanica
	E			C	6796	CUSE2	Italian cypress	Cupressus	sempervirens
	E			C	6834	CYAN	parrotfeather treefern	Cyathea	andina
	E			C	6835	CYAR	West Indian treefern	Cyathea	arborea
	E			C	6839	CYFU	Jamaican treefern	Cyathea	furfuracea
	E			C	6843	CYPA7	small treefern	Cyathea	parvula
	E			C	6848	CYTE10	helecho gigante	Cyathea	tenera
	E			C	6850	CYSI	Cybianthus sintenisii	Cybianthus	sintenisii
	E			C	6852	CYCI3	queen sago	Cycas	circinalis
	E			C	6857	CYPO2	oreganillo falso	Cynometra	portoricensis
	E			C	6862	CYRA	swamp titi	Cyrilla	racemiflora
	E			C	6867	DAEX	candletree	Dacryodes	excelsa
	E			C	6869	DASI	Indian rosewood	Dalbergia	sissoo
	E			C	6871	DAAM2	burn nose	Daphnopsis	americana
	E			C	6872	DAHE2	Heller's cieneguillo	Daphnopsis	helleriana
	E			C	6873	DAPH	emajagua de sierra	Daphnopsis	philippiana
	E			C	6883	DERE	royal poinciana	Delonix	regia
	E			C	6888	DEAR	angelica tree	Dendropanax	arboreus
	E			C	6889	DELA3	palo de vaca	Dendropanax	laurifolius
	E			C	6896	DIIN6	chulta	Dillenia	indica
	E			C	6899	DILO7	Dimocarpus longan	Dimocarpus	longan
	E			C	6909	DIRE6	black apple	Diospyros	revoluta
	E			C	6912	DISI3	Chinese persimmon	Diospyros	sintenisii
	E			C	6923	DIMY	jaboncillo	Ditta	myricoides
	E			C	6927	DOVI	Florida hopbush	Dodonaea	viscosa
	E			C	6930	DOHE2	Ceylon gooseberry	Dovyalis	hebecarpa
	E			C	6932	DRFR2	fragrant dracaena	Dracaena	fragrans
	E			C	6937	DRAL5	cafeillo	Drypetes	alba
	E			C	6938	DRGL2	varital	Drypetes	glauca
	E			C	6939	DRIL	rosewood	Drypetes	ilicifolia
	E			C	6940	DRLA3	guiana plum	Drypetes	lateriflora
	E			C	6961	DUER	golden dewdrops	Duranta	erecta
	E			C	6966	DYLU	Dypsis lutescens	Dypsis	lutescens
	E			C	6996	ENCY	monkeysoap	Enterolobium	cyclocarpum
	E			C	6998	ERJA3	loquat	Eriobotrya	japonica
	E			C	7000	ERFR4	blacktorch	Erithalis	fruticosa
	E			C	7004	ERBE3	machete	Erythrina	berteriana
	E			C	7005	ERCO22	coral erythrina	Erythrina	corallodendron
	E			C	7006	ERCR6	crybabytree	Erythrina	crista-galli
	E			C	7007	EREG	cock's spur	Erythrina	eggersii
	E			C	7008	ERFU2	bucayo	Erythrina	fusca
	E			C	7011	ERPO5	mountain immortelle	Erythrina	poeppigiana
	E			C	7015	ERVA7	tiger's claw	Erythrina	variegata
	E			C	7016	ERVAO	tiger's claw	Erythrina	variegata

Core	East	West	Wood-land	Carib-bean	FIA Code	PLANTS Code	Common Name	Genus	Species
	E			C	7019	ERAR17	swamp-redwood	Erythroxylum	areolatum
	E			C	7021	ERRO3	ratwood	Erythroxylum	rotundifolium
	E			C	7022	ERRU4	rufous false cocaine	Erythroxylum	rufum
	E			C	7024	ERUR4	Urban's false cocaine	Erythroxylum	urbanii
	E			C	7034	EUDE2	Indonesian gum	Eucalyptus	deglupta
	E			C	7043	EUMA23	spotted gum	Eucalyptus	maculata
	E			C	7046	EUPA	gray ironbark	Eucalyptus	paniculata
	E			C	7049	EURE2	redmahogany	Eucalyptus	resinifera
	E			C	7053	EUSA	Sydney bluegum	Eucalyptus	saligna
	E			C	7060	EUAX	white stopper	Eugenia	axillaris
	E			C	7061	EUBI	blackrodwood	Eugenia	biflora
	E			C	7062	EUBO3	Sierra de Cayey stopper	Eugenia	boqueronensis
	E			C	7063	EUBO4	guayabota de sierra	Eugenia	borinquensis
	E			C	7066	EUCO4	redberry stopper	Eugenia	confusa
	E			C	7067	EUCO5	lathberry	Eugenia	cordata
	E			C	7068	EUCOS	Eugenia cordata	Eugenia	cordata
	E			C	7069	EUCO13	sperry guava	Eugenia	corozalensis
	E			C	7071	EUDO	serrette guave	Eugenia	domingensis
	E			C	7072	EUEG	guasabara	Eugenia	eggersii
	E			C	7075	EUGL6	smooth rodwood	Eugenia	glabrata
	E			C	7076	EUHA4	Luquillo Mountain stopper	Eugenia	haematocarpa
	E			C	7081	EULI	privet stopper	Eugenia	ligustrina
	E			C	7084	EUMO	birdcherry	Eugenia	monticola
	E			C	7089	EUPR4	rockmyrtle	Eugenia	procera
	E			C	7090	EUPS	Christmas cherry	Eugenia	pseudopsidium
	E			C	7093	EUSE9	serrasuela	Eugenia	serrasuela
	E			C	7094	EUSE10	sessileleaf stopper	Eugenia	sessiliflora
	E			C	7098	EUST3	Stahl's stopper	Eugenia	stahlii
	E			C	7100	EUST6	Stewardson's stopper	Eugenia	stewardsonii
	E			C	7103	EUUN	Underwood's stopper	Eugenia	underwoodii
	E			C	7104	EUUN2	Surinam cherry	Eugenia	uniflora
	E			C	7105	EUXE	aridland stopper	Eugenia	xerophytica
	E			C	7109	EUCO24	Mexican shrubby spurge	Euphorbia	cotinifolia
	E			C	7111	EULA8	mottled spurge	Euphorbia	lactea
	E			C	7112	EUNE4	Indian spurgetree	Euphorbia	neriifolia
	E			C	7113	EUPE8	manchineel berry	Euphorbia	petiolaris
	E			C	7116	EUTI	Indiantree spurge	Euphorbia	tirucalli
	E			C	7135	EXCA	Caribbean princewood	Exostema	caribaeum
	E			C	7136	EXEL	plateado	Exostema	ellipticum
	E			C	7137	EXSA2	Exostema sanctae-luciae	Exostema	sanctae-luciae
	E			C	7146	FAOC	false coffee	Faramea	occidentalis
	E			C	7148	FIAM	Jamaican cherry fig	Ficus	americana
	E			C	7149	FIBE2	Indian banyan	Ficus	benghalensis
	E			C	7150	FIBE	weeping fig	Ficus	benjamina
	E			C	7151	FICA	edible fig	Ficus	carica
	E			C	7154	FIDR3	brown-woolly fig	Ficus	drupacea
	E			C	7155	FIEL	Indian rubberplant	Ficus	elastica
	E			C	7158	FILU	Ficus lutea	Ficus	lutea
	E			C	7159	FILY	fiddleleaf fig	Ficus	lyrata
	E			C	7160	FIMI2	Chinese banyan	Ficus	microcarpa
	E			C	7162	FINO3	tibig	Ficus	nota
	E			C	7164	FIOB	amate	Ficus	obtusifolia

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	E			C	7166	FIRE3	peepul tree	Ficus	religiosa
	E			C	7173	FIST	jaguey	Ficus	stahlii
	E			C	7174	FISY2	sycamore fig	Ficus	sycomorus
	E			C	7177	FITR	jaguey blanco	Ficus	trigonata
	E			C	7184	FLIN	governor's plum	Flacourtia	indica
	E			C	7185	FLIN3	batoko plum	Flacourtia	inermis
	E			C	7190	FLAC	Flueggea acidoton	Flueggea	acidoton
	E			C	7194	FOEG	inkbush	Forestiera	eggersiana
	E			C	7195	FORH	caca ravet	Forestiera	rhamnifolia
	E			C	7196	FOSE	Florida swampprivet	Forestiera	segregata
	E			C	7198	FOMA2	oval kumquat	Fortunella	margarita
	E			C	7202	FRSPL	West Indian buckthorn	Frangula	sphaerosperma
	E			C	7206	FRUH	shamel ash	Fraxinus	uhdei
	E			C	7210	FUEL	silkrubber	Funtumia	elastica
	E			C	7212	GADU3	Gourka	Garcinia	dulcis
	E			C	7213	GAHE5	lemon saptree	Garcinia	hessii
	E			C	7214	GAMA10	mangosteen	Garcinia	mangostana
	E			C	7218	GAPO2	palo de cruz	Garcinia	portoricensis
	E			C	7223	GAXA	Garcinia xanthochymus	Garcinia	xanthochymus
	E			C	7231	GAAT	llume	Gaussia	attenuata
	E			C	7235	GEAM	jagua	Genipa	americana
	E			C	7237	GEPE4	arbol de Navidad	Gesneria	pedunculosa
	E			C	7239	GIRO	bastard gregre	Ginoria	rohrii
	E			C	7245	GLSE2	quickstick	Gliricidia	sepium
	E			C	7256	GOEL	mata buey	Goetzea	elegans
	E			C	7258	GOLI	grand merisier	Gomidesia	lindeniana
	E			C	7262	GOBA	Creole cotton	Gossypium	barbadense
	E			C	7264	GOHIH2	Gossypium hirsutum	Gossypium	hirsutum
	E			C	7268	GROT	Graffenrieda ottoschulzii	Graffenrieda	ottoschulzii
	E			C	7273	GRRO	silkoak	Grevillea	robusta
	E			C	7279	GUOF	lignum-vitae	Guajacum	officinale
	E			C	7280	GUSA	holywood	Guajacum	sanctum
	E			C	7285	GUFR	black mampoo	Guapira	fragrans
	E			C	7286	GUOB	corcho prieto	Guapira	obtusata
	E			C	7288	GUGL3	alligatorwood	Guarea	glabra
	E			C	7290	GUGU	American muskwood	Guarea	guidonia
	E			C	7294	GUBL	haya minga	Guatteria	blainii
	E			C	7295	GUCA2	haya blanca	Guatteria	caribaea
	E			C	7298	GUUL	bastardcedar	Guazuma	ulmifolia
	E			C	7299	GUEL	hammock velvetseed	Guettarda	elliptica
	E			C	7300	GUKR	frogwood	Guettarda	krugii
	E			C	7302	GUOD	cucubano de vieques	Guettarda	odorata
	E			C	7303	GUOV	cucubano	Guettarda	ovalifolia
	E			C	7305	GUPU	roseta	Guettarda	pungens
	E			C	7306	GUSC	wild guave	Guettarda	scabra
	E			C	7309	GUVA	cucubano de monte	Guettarda	valenzuelana
	E			C	7315	GYLA	West Indian false box	Gyminda	latifolia
	E			C	7317	GYLU	oysterwood	Gymnanthes	lucida
	E			C	7321	HACA2	bloodwoodtree	Haematoxylum	campechianum
	E			C	7327	HASAO	palo de hueso	Haenianthus	salicifolius
	E			C	7330	HAPA3	scarletbush	Hamelia	patens
	E			C	7336	HECU10	false locust	Hebestigma	cubense

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	E			C	7341	HEAR	cigarbush	Hedyosmum	arborescens
	E			C	7347	HEJA	screwtree	Helicteres	jamaicensis
	E			C	7353	HEFA5	camasey peludo	Henriettea	fascicularis
	E			C	7354	HEMA11	MacFadyen's camasey	Henriettea	macfadyenii
	E			C	7355	HEME5	thinleaf camasey	Henriettea	membranifolia
	E			C	7357	HESQ	jusillo	Henriettea	squamulosum
	E			C	7366	HESO	mago	Hernandia	sonora
	E			C	7403	HIEL	mahoe	Hibiscus	elatus
	E			C	7409	HIPE3	seaside mahoe	Hibiscus	pernambucensis
	E			C	7410	HIRO3	shoeblackplant	Hibiscus	rosa-sinensis
	E			C	7412	HITI	sea hibiscus	Hibiscus	tiliaceus
	E			C	7418	HIRU2	teta de burra cinarron	Hirtella	rugosa
	E			C	7420	HITR3	pigeonberry	Hirtella	triandra
	E			C	7422	HORA	white cogwood	Homalium	racemosum
	E			C	7434	HUCR	sandbox tree	Hura	crepitans
	E			C	7438	HYCL	cedro macho	Hyeronima	clusioides
	E			C	7442	HYCO	stinkingtoe	Hymenaea	courbaril
	E			C	7445	HYTR	inkwood	Hypelate	trifoliata
	E			C	7446	HYLA8	limestone snakevine	Hyperbaena	laurifolia
	E			C	7455	ILCA	dahoon	Ilex	cassine
	E			C	7456	ILCO3	te	Ilex	cookii
	E			C	7457	ILGU	maconcona	Ilex	guianensis
	E			C	7458	ILMA	Caribbean holly	Ilex	macfadyenii
	E			C	7459	ILNI	Puerto Rico holly	Ilex	nitida
	E			C	7462	ILSI	gongolin	Ilex	sideroxyloides
	E			C	7463	ILSI2	Sintenis' holly	Ilex	sintenisii
	E			C	7465	ILUR	Urban's holly	Ilex	urbaniana
	E			C	7466	ILURR	Ilex urbaniana	Ilex	urbaniana
	E			C	7467	INGA	inga	Inga	spp.
	E			C	7470	INLA	sacky sac bean	Inga	laurina
	E			C	7471	INNOQ	Inga nobilis	Inga	nobilis
	E			C	7474	INVE	river koko	Inga	vera
	E			C	7479	IXFE	palo de hierro	Ixora	ferrea
	E			C	7481	IXTH	white jungleflame	Ixora	thwaitesii
	E			C	7482	JAMI	black poui	Jacaranda	mimosifolia
	E			C	7485	JAAR2	braceletwood	Jacquinia	armillaris
	E			C	7487	JABE	bois bande	Jacquinia	berteroi
	E			C	7490	JAUM	chirriador	Jacquinia	umbellata
	E			C	7491	JACU2	Barbados nut	Jatropha	curcas
	E			C	7492	JAHE	wild oilnut	Jatropha	hernandiifolia
	E			C	7493	JAMU	coralbush	Jatropha	multifida
	E			C	7495	JUJA	West Indian walnut	Juglans	jamaicensis
	E			C	7499	KHAN	Khaya anthotheca	Khaya	anthotheca
	E			C	7501	KHSE2	Senegal mahogany	Khaya	senegalensis
	E			C	7503	KIAF	Kigelia africana	Kigelia	africana
	E			C	7506	KLHO	guest tree	Kleinhovia	hospita
	E			C	7508	KOPO	Koanophyllon polyodon	Koanophyllon	polyodon
	E			C	7514	KRFE	leadwood	Krugiodendron	ferreum
	E			C	7530	LAPR2	cuero de rana	Laetia	procera
	E			C	7532	LAIN	crapemyrtle	Lagerstroemia	indica
	E			C	7533	LASP	pride of India	Lagerstroemia	speciosa
	E			C	7541	LAPO	nino de cota	Laplacea	portoricensis

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	E			C	7550	LAIN5	henna	Lawsonia	inermis
	E			C	7552	LEKR	Krug's roughleaf	Leandra	krugiana
	E			C	7556	LEQU	pitahaya	Leptocereus	quadricostatus
	E			C	7565	LELE10	white leadtree	Leucaena	leucocephala
	E			C	7569	LIBR5	Maria laurel	Licaria	brittoniana
	E			C	7570	LIPA9	Puerto Rico cinnamon	Licaria	parvifolia
	E			C	7573	LITR	pepperleaf sweetwood	Licaria	triandra
	E			C	7574	LIAM	Amur privet	Ligustrum	amurense
	E			C	7590	LODO5	geno geno	Lonchocarpus	domingensis
	E			C	7591	LOGL2	geno	Lonchocarpus	glaucifolius
	E			C	7592	LOHE7	broadleaf lancepod	Lonchocarpus	heptaphyllus
	E			C	7600	LUSP11	luehea	Luehea	speciosa
	E			C	7604	LUNAN	lunania	Lunania	spp.
	E			C	7606	LUEK	Lunania ekmanii	Lunania	ekmanii
	E			C	7608	LYRU2	St. Thomas staggerbush	Lyonia	rubiginosa
	E			C	7628	MALU2	palo de hoz	Machaerium	lunatum
	E			C	7630	MAPO6	Puerto Rico alfilerillo	Machaonia	portoricensis
	E			C	7632	MATI3	Maclura tinctoria	Maclura	tinctoria
	E			C	7633	MAEM2	umbrella-tree	Maesopsis	eminii
	E			C	7635	MAPO2	Puerto Rico magnolia	Magnolia	portoricensis
	E			C	7636	MASP	laurel magnolia	Magnolia	splendens
	E			C	7643	MACO11	Singapore holly	Malpighia	coccigera
	E			C	7644	MAEM	Barbados cherry	Malpighia	emarginata
	E			C	7645	MAFU2	palo bronco	Malpighia	fucata
	E			C	7646	MAGL6	wild crapemyrtle	Malpighia	glabra
	E			C	7647	MAIN5	cowhage cherry	Malpighia	infestissima
	E			C	7648	MALI2	bastard cherry	Malpighia	linearis
	E			C	7652	MAAM2	mammee apple	Mammea	americana
	E			C	7662	MABI5	bulletwood	Manilkara	bidentata
	E			C	7663	MABIS	Manilkara bidentata	Manilkara	bidentata
	E			C	7667	MAJA2	wild dilly	Manilkara	jaimiqui
	E			C	7669	MAPL2	zapote de costa	Manilkara	pleeana
	E			C	7673	MAVA3	nisperillo	Manilkara	valenzuela
	E			C	7674	MAZA	sapodilla	Manilkara	zapota
	E			C	7677	MARA3	palo de cana	Mappia	racemosa
	E			C	7682	MANO	bastard hogberry	Margaritaria	nobilis
	E			C	7684	MASI3	beruquillo	Marlierea	sintenisii
	E			C	7688	MAAP5	Matayba apetala	Matayba	apetala
	E			C	7689	MADO2	negra lora	Matayba	domingensis
	E			C	7695	MACY2	Caribbean mayten	Maytenus	cymosa
	E			C	7697	MAEL3	Puerto Rico mayten	Maytenus	elongata
	E			C	7698	MALA8	white cinnamon	Maytenus	laevigata
	E			C	7699	MAPO5	ponce mayten	Maytenus	ponceana
	E			C	7702	MELA7	Mecranium latifolium	Mecranium	latifolium
	E			C	7717	MEBI	Spanish lime	Melicoccus	bijugatus
	E			C	7763	MEHE	aguacatillo	Meliosma	herbertii
	E			C	7764	MEOB2	cacaillo	Meliosma	obtusifolia
	E			C	7768	METO4	teabush	Melochia	tomentosa
	E			C	7803	MILA10	hairy johnnyberry	Miconia	lanata
	E			C	7804	MIAF	saquiyac	Miconia	affinis
	E			C	7806	MIFO	Puerto Rico johnnyberry	Miconia	foveolata
	E			C	7807	MIIM	camasey de costilla	Miconia	impetiolaris

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	E			C	7808	MILA8	smooth johnnyberry	Miconia	laevigata
	E			C	7810	MIMI3	camasey cuatrocanales	Miconia	mirabilis
	E			C	7812	MIPA7	camasey racimoso	Miconia	pachyphylla
	E			C	7813	MIPR3	granadillo bobo	Miconia	prasina
	E			C	7814	MIPU9	auquey	Miconia	punctata
	E			C	7815	MIPY2	ridge johnnyberry	Miconia	pycnoneura
	E			C	7816	MIRA2	camasey felpa	Miconia	racemosa
	E			C	7817	MIRU4	peralejo	Miconia	rubiginosa
	E			C	7818	MISE2	jau jau	Miconia	serrulata
	E			C	7819	MISI2	mountain johnnyberry	Miconia	sintenisii
	E			C	7821	MISU3	forest johnnyberry	Miconia	subcorymbosa
	E			C	7822	MITE4	rajador	Miconia	tetrandra
	E			C	7823	MITH	camasey tomaso	Miconia	thomasiana
	E			C	7828	MIGA	caimitillo verde	Micropholis	garciniifolia
	E			C	7829	MIGU2	Micropholis guyanensis	Micropholis	guyanensis
	E			C	7833	MIAR4	elegant mimosa	Mimosa	arenosa
	E			C	7839	MONOD	monodora	Monodora	spp.
	E			C	7845	MOCE2	Morella cerifera	Morella	cerifera
	E			C	7847	MOHO3	Morella holdridgeana	Morella	holdridgeana
	E			C	7849	MOCI3	Indian mulberry	Morinda	citrifolia
	E			C	7855	MOOL	horseradishtree	Moringa	oleifera
	E			C	7857	MOAM	ratapple	Morisonia	americana
	E			C	7862	MODO2	murta	Mouriri	domingensis
	E			C	7863	MOHE	mameyuelo	Mouriri	helleri
	E			C	7867	MUCA4	strawberrytree	Muntingia	calabura
	E			C	7869	MUEX2	Murraya exotica	Murraya	exotica
	E			C	7886	MYCI	red rodwood	Myrcia	citrifolia
	E			C	7887	MYDE	cieneguillo	Myrcia	deflexa
	E			C	7888	MYFA3	curame	Myrcia	fallax
	E			C	7889	MYLE	guayabacon	Myrcia	leptoclada
	E			C	7890	MYPA	ausu	Myrcia	paganii
	E			C	7891	MYSP	punchberry	Myrcia	splendens
	E			C	7893	MYFR	twinberry	Myrcianthes	fragrans
	E			C	7895	MYFL	guavaberry	Myrciaria	floribunda
	E			C	7905	MYFR2	cercipo	Myrospermum	frutescens
	E			C	7907	MYBA3	balsam of Tolu	Myroxylon	balsamum
	E			C	7911	MYCO2	leathery colicwood	Myrsine	coriacea
	E			C	7912	MYCU2	Myrsine cubana	Myrsine	cubana
	E			C	7932	NECO	Nectandra coriacea	Nectandra	coriacea
	E			C	7933	NEHI2	shinglewood	Nectandra	hihua
	E			C	7934	NEKR	Nectandra krugii	Nectandra	krugii
	E			C	7935	NEME3	Nectandra membranacea	Nectandra	membranacea
	E			C	7936	NEPA4	Nectandra patens	Nectandra	patens
	E			C	7939	NETU	Nectandra turbacensis	Nectandra	turbacensis
	E			C	7940	NEBU	saltwood	Neea	buxifolia
	E			C	7944	NECA7	kadam	Neolamarckia	cadamba
	E			C	7946	NERE2	aquilon	Neolaugeria	resinosa
	E			C	7956	NEOL	oleander	Nerium	oleander
	E			C	7976	OCMO4	African bird's-eye bush	Ochna	mossambicensis
	E			C	7980	OCPY	Ochroma pyramidale	Ochroma	pyramidale
	E			C	7990	OCFL	laurel espada	Ocotea	floribunda
	E			C	7991	OCFO	black sweetwood	Ocotea	foeniculacea

Core	East	West	Wood-land	Carib-bean	FIA Code	PLANTS Code	Common Name	Genus	Species
	E			C	7994	OCLE	loblolly sweetwood	Ocotea	leucoxylon
	E			C	7996	OCMO	nemoca	Ocotea	moschata
	E			C	7997	OCNE	laurel sassafras	Ocotea	nemodaphne
	E			C	7999	OCPO	laurel de paloma	Ocotea	portoricensis
	E			C	8001	OCSP	nemoca cimarrona	Ocotea	spathulata
	E			C	8003	OCWR	Wright's laurel canelon	Ocotea	wrightii
	E			C	8020	ORKR	peronia	Ormosia	krugii
	E			C	8027	OTRH	pincho palo de rosa	Ottoschulzia	rhodoxylon
	E			C	8029	OUIL	chicharron amarillo	Ouratea	ilicifolia
	E			C	8030	OULI	abey amarillo	Ouratea	littoralis
	E			C	8032	OUST	guanabanilla	Ouratea	striata
	E			C	8033	OXLA4	blacklancewood	Oxandra	lanceolata
	E			C	8034	OXLA5	haya	Oxandra	laurifolia
	E			C	8037	PAIN7	wild chestnut	Pachira	insignis
	E			C	8045	PAAL9	tafetan	Palicourea	alpina
	E			C	8047	PACR3	red cappel	Palicourea	crocea
	E			C	8049	PACR18	Palicourea croceoides	Palicourea	croceoides
	E			C	8051	PAGU	showy cappel	Palicourea	guianensis
	E			C	8088	PAUT	common screwpine	Pandanus	utilis
	E			C	8099	PACR2	scratchthroat	Parathesis	crenulata
	E			C	8106	PARKI3	parkia	Parkia	spp.
	E			C	8110	PATI5	Parkia timoriana	Parkia	timoriana
	E			C	8111	PAAC3	Jerusalem thorn	Parkinsonia	aculeata
	E			C	8113	PAAC13	cuachilote	Parmentiera	aculeata
	E			C	8114	PACE8	candle tree	Parmentiera	cereifera
	E			C	8121	PEPT3	Peltophorum pterocarpum	Peltophorum	pterocarpum
	E			C	8125	PEBU4	butter tree	Pentadesma	butyracea
	E			C	8127	PEBU2	jiqi	Pera	bumeliifolia
	E			C	8134	PEKR	canela	Persea	krugii
	E			C	8138	PEUR2	aquacatillo	Persea	urbaniana
	E			C	8141	PEDO	bastard stopper	Petitia	domingensis
	E			C	8143	PHGR11	aquilon prieto	Phialanthus	grandifolius
	E			C	8144	PHMY	candlewood	Phialanthus	myrtilloides
	E			C	8157	PHAC3	Tahitian gooseberry tree	Phyllanthus	acidus
	E			C	8160	PHJU2	gamo de costa	Phyllanthus	juglandifolius
	E			C	8162	PHOR10	Phyllanthus orbicularis	Phyllanthus	orbicularis
	E			C	8164	PIPE	Florida bitterbush	Picramnia	pentandra
	E			C	8167	PIEX	bitterwood	Picrasma	excelsa
	E			C	8169	PIAC	fustic	Pictetia	aculeata
	E			C	8171	PIRA3	aceitillo	Pilocarpus	racemosus
	E			C	8173	PIRO6	Royen's tree cactus	Pilosocereus	royenii
	E			C	8175	PIDI2	allspice	Pimenta	dioica
	E			C	8177	PIRA	bayrumtree	Pimenta	racemosa
	E			C	8178	PIRAG	bayrumtree	Pimenta	racemosa
	E			C	8183	PICA18	Caribbean pine	Pinus	caribaea
	E			C	8184	PIMA11	Chinese red pine	Pinus	massoniana
	E			C	8185	PIME2	Merkus pine	Pinus	merkusii
	E			C	8186	PIOO2	ocote chino	Pinus	oocarpa
	E			C	8187	PIPA13	Mexican weeping pine	Pinus	patula
	E			C	8190	PIAD	higuillo de hoja menuda	Piper	aduncum
	E			C	8191	PIAM2	higuillo de limon	Piper	amalago
	E			C	8192	PIBL	moth pepper	Piper	blattarum

Core	East	West	Wood-land	Carib-bean	FIA Code	PLANTS Code	Common Name	Genus	Species
	E			C	8193	PIGL3	Guyanese pepper	Piper	glabrescens
	E			C	8194	PIHI2	Jamaican pepper	Piper	hispidum
	E			C	8195	PIJA	Caracas pepper	Piper	jacquemontianum
	E			C	8196	PIMA4	marigold pepper	Piper	marginatum
	E			C	8199	PISW	spanish elder	Piper	swartzianum
	E			C	8208	PICA5	stinkwood	Piscidia	carthagenensis
	E			C	8211	PIAL3	corcho bobo	Pisonia	albida
	E			C	8216	PISU	water mampoo	Pisonia	subcordata
	E			C	8220	PIDU	monkeypod	Pithecellobium	dulce
	E			C	8223	PIUN	catclaw blackbead	Pithecellobium	unguis-cati
	E			C	8249	PLOR80	Oriental arborvitae	Platycladus	orientalis
	E			C	8255	PLMA6	chupa gallo	Pleodendron	macranthum
	E			C	8266	PLAL	nosegaytree	Plumeria	alba
	E			C	8268	PLOB2	Singapore graveyard flower	Plumeria	obtusa
	E			C	8269	PLOBO	Plumeria obtusa	Plumeria	obtusa
	E			C	8271	PLRU2	templetree	Plumeria	rubra
	E			C	8273	POCO3	yucca plum pine	Podocarpus	coriaceus
	E			C	8275	POFL20	Poitea florida	Poitea	florida
	E			C	8276	POPU19	Poitea punicea	Poitea	punicea
	E			C	8279	POCO5	violet tree	Polygala	cowellii
	E			C	8280	POPE13	crevajosa	Polygala	penaea
	E			C	8284	POGU	geranium aralia	Polyscias	guilfoylei
	E			C	8300	PODI5	cocuyo	Pouteria	dictyoneura
	E			C	8301	POHO4	redmammee	Pouteria	hotteana
	E			C	8302	POMU6	bullytree	Pouteria	multiflora
	E			C	8305	POSA13	mammee sapote	Pouteria	sapota
	E			C	8311	PRACM	Prestoea acuminata	Prestoea	acuminata
	E			C	8340	PRCR2	guasimilla	Prockia	crucis
	E			C	8342	PRCI4	jand	Prosopis	cineraria
	E			C	8344	PRPA4	kiawe	Prosopis	pallida
	E			C	8346	PRMY	West Indian cherry	Prunus	myrtifolia
	E			C	8347	PROC	western cherry laurel	Prunus	occidentalis
	E			C	8349	PRSEC	Prunus serotina	Prunus	serotina
	E			C	8352	PSSP2	false breadnut	Pseudolmedia	spuria
	E			C	8353	PSSA	Florida cherry palm	Pseudophoenix	sargentii
	E			C	8354	PSAM	mountain guava	Psidium	amplexicaule
	E			C	8356	PSGU	guava	Psidium	guajava
	E			C	8358	PSLOO	Psidium longipes	Psidium	longipes
	E			C	8359	PSSI2	Sintenis' guava	Psidium	sintenisii
	E			C	8361	PSBE	cachimbo-cumun	Psychotria	berteriana
	E			C	8362	PSBR2	palo de cachimbo	Psychotria	brachiata
	E			C	8363	PSBR3	Browne's wild coffee	Psychotria	brownei
	E			C	8364	PSDO2	Psychotria domingensis	Psychotria	domingensis
	E			C	8367	PSGR2	cachimbo grande	Psychotria	grandis
	E			C	8389	PSMA4	cachimbo de gato	Psychotria	maleolens
	E			C	8391	PSMA5	cachimbo de maricao	Psychotria	maricaensis
	E			C	8394	PSMI	thicket wild coffee	Psychotria	microdon
	E			C	8395	PSNU2	floating balsamo	Psychotria	nutans
	E			C	8397	PSPU	hairy wild coffee	Psychotria	pubescens
	E			C	8407	PTIN2	pterocarpus	Pterocarpus	indicus
	E			C	8408	PTMA7	Burma padauk	Pterocarpus	macrocarpus
	E			C	8409	PTMA3	Malabar kino	Pterocarpus	marsupium

Core	East	West	Wood-land	Carib-bean	FIA Code	PLANTS Code	Common Name	Genus	Species
	E			C	8410	PTOF	dragonsblood tree	Pterocarpus	officinalis
	E			C	8419	PUGR2	pomegranate	Punica	granatum
	E			C	8422	QUTU	swizzlestick tree	Quararibea	turbinata
	E			C	8425	RAAC	white indigoberry	Randia	aculeata
	E			C	8433	RANI2	palo amargo	Rauvolfia	nitida
	E			C	8436	RAMA7	traveler's tree	Ravenala	madagascariensis
	E			C	8439	RAUR	tortugo prieto	Ravenia	urbanii
	E			C	8444	REGU	guama	Reynosia	guama
	E			C	8445	REKR	Krug's darlingplum	Reynosia	krugii
	E			C	8447	REUN	sloe	Reynosia	uncinata
	E			C	8472	RICO3	castorbean	Ricinus	communis
	E			C	8476	ROAC2	greenheart ebony	Rochefortia	acanthophora
	E			C	8478	ROSP8	Rochefortia spinosa	Rochefortia	spinosa
	E			C	8481	ROMU3	wild sugar apple	Rollinia	mucosa
	E			C	8483	ROIN4	cordobancillo	Rondeletia	inermis
	E			C	8484	ROPI3	cordobancillo peludo	Rondeletia	pilosa
	E			C	8485	ROPO	Juan Tomas	Rondeletia	portoricensis
	E			C	8489	ROBO	Puerto Rico royal palm	Roystonea	borinquena
	E			C	8490	ROEL	Roystonea elata	Roystonea	elata
	E			C	8494	SACA	Puerto Rico palmetto	Sabal	causiarum
	E			C	8499	SAUM3	white hogwood	Sagraea	umbrosa
	E			C	8501	SAHU	Salix humboldtiana	Salix	humboldtiana
	E			C	8505	SASA10	raintree	Samanea	saman
	E			C	8509	SANIC4	common elderberry	Sambucus	nigra
	E			C	8529	SASA4	wingleaf soapberry	Sapindus	saponaria
	E			C	8533	SAGL5	gumtree	Sapium	glandulosum
	E			C	8535	SALA25	hinchahuevos	Sapium	laurifolium
	E			C	8536	SALA8	milktree	Sapium	laurocerasus
	E			C	8546	SASE6	amansa guapo	Savia	sessiliflora
	E			C	8554	SCFR	Florida boxwood	Schaefferia	frutescens
	E			C	8556	SADO7	guayabilla	Samyda	dodecandra
	E			C	8557	SCGL6	yuquilla	Schefflera	gleasonii
	E			C	8558	SCMO10	matchwood	Schefflera	morototonii
	E			C	8563	SCTE	Brazilian peppertree	Schinus	terebinthifolius
	E			C	8565	SCPA23	Brazilian firetree	Schizolobium	parahybum
	E			C	8567	SCOL3	lac tree	Schleichera	oleosa
	E			C	8571	SCAR2	arana	Schoepfia	arenaria
	E			C	8572	SCOB	white beefwood	Schoepfia	obovata
	E			C	8573	SCSC3	gulf graytwig	Schoepfia	schreberi
	E			C	8588	SEAL4	emperor's candlesticks	Senna	alata
	E			C	8589	SEAT3	flor de San Jose	Senna	atomaria
	E			C	8591	SEMU5	false sicklepod	Senna	multijuga
	E			C	8594	SEPO5	retama prieta	Senna	polyphylla
	E			C	8596	SESI3	Siamese cassia	Senna	siamea
	E			C	8597	SESP9	casia amarilla	Senna	spectabilis
	E			C	8599	SESU10	Senna sulfurea	Senna	sulfurea
	E			C	8600	SESU4	glossy shower	Senna	surattensis
	E			C	8605	SEGR5	vegetable hummingbird	Sesbania	grandiflora
	E			C	8611	SICU7	espejuelo	Sideroxylon	cubense
	E			C	8613	SIOB	breakbill	Sideroxylon	obovatum
	E			C	8614	SIPO3	Puerto Rico bully	Sideroxylon	portoricense
	E			C	8617	SIMAR	simarouba	Simarouba	spp.

Core	East	West	Wood-land	Carib-bean	FIA Code	PLANTS Code	Common Name	Genus	Species
	E			C	8619	SITU	aceitillo falso	Simarouba	tulae
	E			C	8620	SIDE6	hoja menuda	Siphoneugena	densiflora
	E			C	8622	SLOAN	bullwood	Sloanea	spp.
	E			C	8623	SLAM	motillo	Sloanea	amygdalina
	E			C	8624	SLBE	bullwood	Sloanea	berteriana
	E			C	8626	SOBAB	Solanum bahamense	Solanum	bahamense
	E			C	8627	SODO3	mullein nightshade	Solanum	donianum
	E			C	8629	SOER2	potatotree	Solanum	erianthum
	E			C	8632	SONU4	forest nightshade	Solanum	nudum
	E			C	8633	SOPO	cakalaka berry	Solanum	polygamum
	E			C	8634	SORU	tabacon aspero	Solanum	rugosum
	E			C	8636	SOTO4	turkey berry	Solanum	torvum
	E			C	8644	SPCA2	African tuliptree	Spathodea	campanulata
	E			C	8649	SPDU3	Spondias dulcis	Spondias	dulcis
	E			C	8650	SPMO	yellow mombin	Spondias	mombin
	E			C	8652	SPPU	purple mombin	Spondias	purpurea
	E			C	8654	STMO	cobana negra	Stahlia	monosperma
	E			C	8664	STAP	Panama tree	Sterculia	apetala
	E			C	8666	STFO2	hazel sterculia	Sterculia	foetida
	E			C	8674	STPO3	palo de jazmin	Styrax	portoricensis
	E			C	8676	SUMA2	bay cedar	Suriana	maritima
	E			C	8678	SWIET	mahogany	Swietenia	spp.
	E			C	8679	SWMA	Honduras mahogany	Swietenia	macrophylla
	E			C	8683	SYLA2	nispero cimarron	Symplocos	lanata
	E			C	8684	SYMA	Martinique sweetleaf	Symplocos	martinicensis
	E			C	8685	SYMI3	aceitunilla	Symplocos	micrantha
	E			C	8701	SYJA	Syzygium jambos	Syzygium	jambos
	E			C	8702	SYMA2	Malaysian apple	Syzygium	malaccense
	E			C	8709	TACH3	roble amarillo	Tabebuia	chrysantha
	E			C	8710	TADO2	primavera	Tabebuia	donnell-smithii
	E			C	8712	TAHA	roble cimarron	Tabebuia	haemantha
	E			C	8713	TAHE	white cedar	Tabebuia	heterophylla
	E			C	8715	TARI	roble de sierra	Tabebuia	rigida
	E			C	8716	TARO	pink trumpet-tree	Tabebuia	rosea
	E			C	8717	TASC2	roble colorado	Tabebuia	schumanniana
	E			C	8720	TACI	milkwood	Tabernaemontana	citrifolia
	E			C	8727	TAAP	Athel tamarisk	Tamarix	aphylla
	E			C	8743	TEST	yellow trumpetbush	Tecoma	stans
	E			C	8744	TEGR	teak	Tectona	grandis
	E			C	8748	TERMI	tropical almond	Terminalia	spp.
	E			C	8750	TECA	troipical almond	Terminalia	catappa
	E			C	8754	TEIV2	Ivory Coast almond	Terminalia	ivorensis
	E			C	8756	TEMY	East Indian almond	Terminalia	myriocarpa
	E			C	8757	TEOB	Peruvian almond	Terminalia	oblonga
	E			C	8761	TESU2	superb terminalia	Terminalia	superba
	E			C	8762	TEHE3	saintedwood	Ternstroemia	heptasepala
	E			C	8763	TELU2	palo colorado	Ternstroemia	luquillensis
	E			C	8764	TEPE	copey vera	Ternstroemia	peduncularis
	E			C	8766	TEST3	mamey de cura	Ternstroemia	stahlii
	E			C	8767	TESU	el yunque colorado	Ternstroemia	subsessilis
	E			C	8768	TEBA	masa	Tetragastris	balsamifera
	E			C	8778	TEAN2	stinkingfish	Tetrazygia	angustifolia

Core	East	West	Wood-land	Carib-bean	FIA Code	PLANTS Code	Common Name	Genus	Species
	E			C	8780	TEBI2	Puerto Rico clover ash	Tetrazygia	biflora
	E			C	8781	TEEL	krekre	Tetrazygia	elaeagnoides
	E			C	8783	TEUR	cenizo	Tetrazygia	urbanii
	E			C	8784	THCA	cacao	Theobroma	cacao
	E			C	8786	THGR2	maga	Thespesia	grandiflora
	E			C	8787	THPO3	Portia tree	Thespesia	populnea
	E			C	8789	THPE3	luckynut	Thevetia	peruviana
	E			C	8793	THST2	ceboruquillo	Thouinia	striata
	E			C	8794	THSTP	Puerto Rico ceboruquillo	Thouinia	striata
	E			C	8803	TIGR3	Brazilian glorytree	Tibouchina	granulosa
	E			C	8811	TOONA	redcedar	Toona	spp.
	E			C	8812	TOCI	Australian redcedar	Toona	ciliata
	E			C	8816	TOCU	boje	Torralbasia	cuneifolia
	E			C	8825	TOFI	cold withe	Tournefortia	filiflora
	E			C	8828	TRLA2	Lamarck's trema	Trema	lamarckianum
	E			C	8829	TRMI2	Jamaican nettletree	Trema	micranthum
	E			C	8833	TRHI3	broomstick	Trichilia	hirta
	E			C	8834	TRPA2	gaita	Trichilia	pallida
	E			C	8836	TRTR8	bariaco	Trichilia	triacantha
	E			C	8842	TRTR7	limeberry	Triphasia	trifolia
	E			C	8843	TRIPL5	Triplaris spp.	Triplaris	spp.
	E			C	8844	TRCU6	ant tree	Triplaris	cumingiana
	E			C	8848	TRRA4	white ramoon	Trophis	racemosa
	E			C	8850	TUOC	muttonwood	Turpinia	occidentalis
	E			C	8853	URBA	scratchbush	Urera	baccifera
	E			C	8854	URCA2	flameberry	Urera	caracasana
	E			C	8855	URCH2	ortiga	Urera	chlorocarpa
	E			C	8861	VAMA5	voa vanga	Vangueria	madagascariensis
	E			C	8871	VIAG	lilac chastetree	Vitex	agnus-castus
	E			C	8873	VIDI2	higuerillo	Vitex	divaricata
	E			C	8881	WALA	Wallenia lamarckiana	Wallenia	lamarckiana
	E			C	8887	WEPI	bastard briziletto	Weinmannia	pinnata
	E			C	8901	XIAM	tallow wood	Ximenia	americana
	E			C	8906	XYBU	mucha-gente	Xylosma	buxifolia
	E			C	8910	XYPA2	spiny logwood	Xylosma	pachyphylla
	E			C	8912	XYSC2	white logwood	Xylosma	schaefferioides
	E			C	8913	XYSC3	Schwaneck's logwood	Xylosma	schwaneckeana
	E			C	8916	YUAL	aloe yucca	Yucca	aloifolia
	E			C	8918	YUGL2	moundlily yucca	Yucca	gloriosa
	E			C	8919	YUGU	bluestem yucca	Yucca	guatemalensis
	E			C	8923	ZABI	Maricao pricklyash	Zanthoxylum	bifoliolatum
	E			C	8924	ZACA3	prickly yellow	Zanthoxylum	caribaeum
	E			C	8928	ZAFL	West Indian satinwood	Zanthoxylum	flavum
	E			C	8931	ZAMA	white pricklyash	Zanthoxylum	martinicense
	E			C	8932	ZAMO	yellow prickle	Zanthoxylum	monophyllum
	E			C	8934	ZAPU2	dotted pricklyash	Zanthoxylum	punctatum
	E			C	8935	ZASP	niaragato	Zanthoxylum	spinifex
	E			C	8937	ZATH	St. Thomas pricklyash	Zanthoxylum	thomasianum
	E			C	8938	ZAPO2	Zapoteca portoricensis	Zapoteca	portoricensis
	E			C	8939	ZIMA	Indian jujube	Ziziphus	mauritiana
	E			C	8940	ZIRE	cacao rojo	Ziziphus	reticulata
	E			C	8941	ZIRI	soana	Ziziphus	rignonii

Core	East	West	Wood-land	Carib-bean	FIA Code	PLANTS Code	Common Name	Genus	Species
	E			C	8943	ZITA	Taylor's jujube	Ziziphus	taylorii

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. Site trees are required for all delineated forest conditions when available.

Code	Common Name	Region
	Softwood Species	
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

Code	Common Name	Region
	Hardwood Species	
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
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

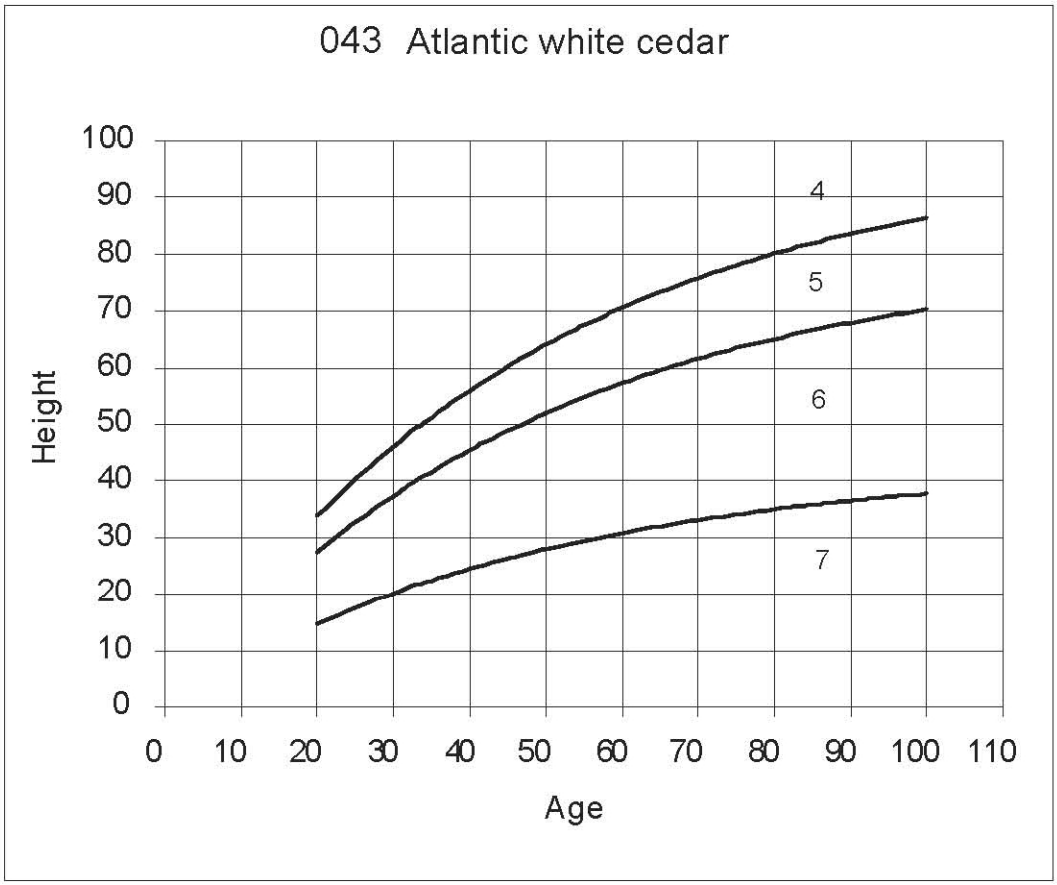
Ideally, site trees in the western U.S. should be between 35-80 years old. If preferred trees cannot be found in this age range, expand the age range to 15-250 years. Reject trees outside the 15-250 year age range, trees that exhibit signs of damage, trees with ring patterns that show signs of suppression, 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:

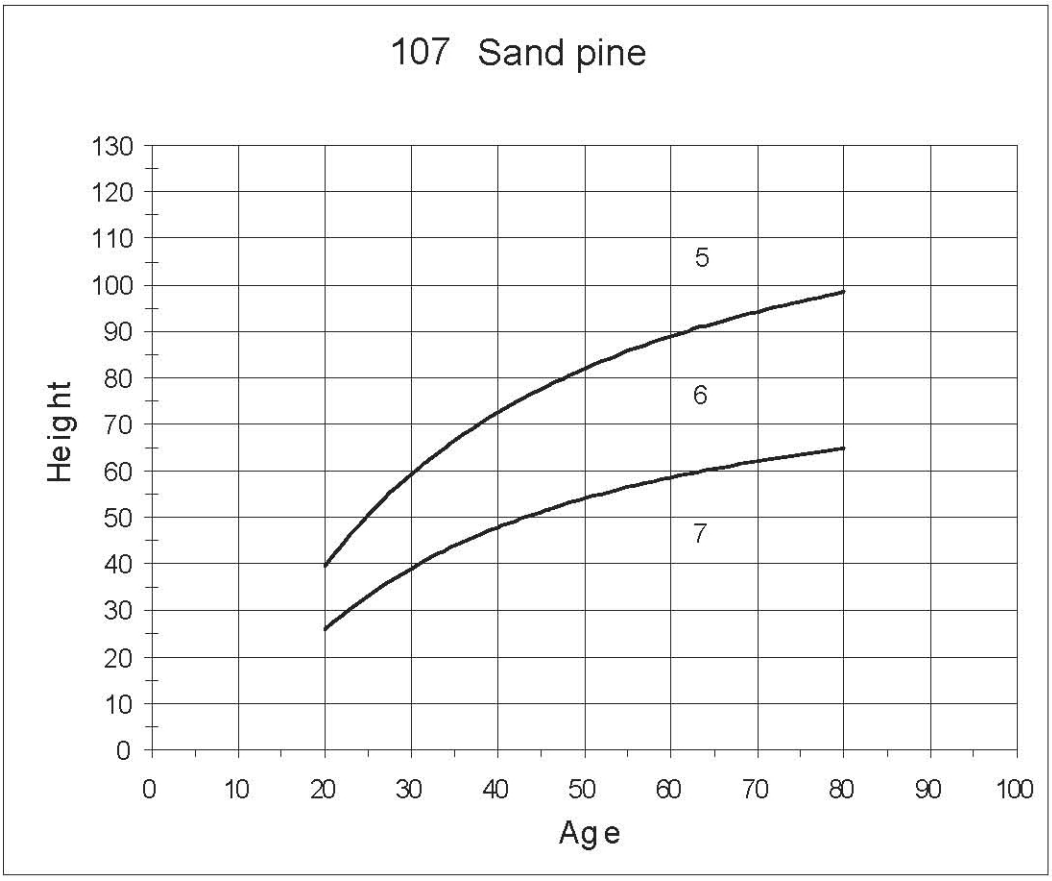
1st Choice: representative of the stand, on the list for your region.
2nd Choice: representative of the stand, on the list for an adjoining western region.
3rd Choice: not representative of the stand, on the list for your region.
4th Choice: not representative of the stand, on the list for an adjoining western region.

Note: PNW = Pacific Northwest FIA, RMRS = Rocky Mountain FIA

Code	Common Name	Region
	Softwood Species	
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
	Hardwood Species	
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
0747	black cottonwood	RMRS, PNW
0748	Fremont poplar	RMRS
0749	narrowleaf cottonwood	RMRS

SOUTHERN SITE CLASS CURVES
(Following pages list available site curves for the southern region.)


043 Atlantic white cedar
Height
Age
4
5
6
7
0
10
20
30
40
50
60
70
80
90
100
110


107 Sand pine
Height
Age
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6
7
0
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30
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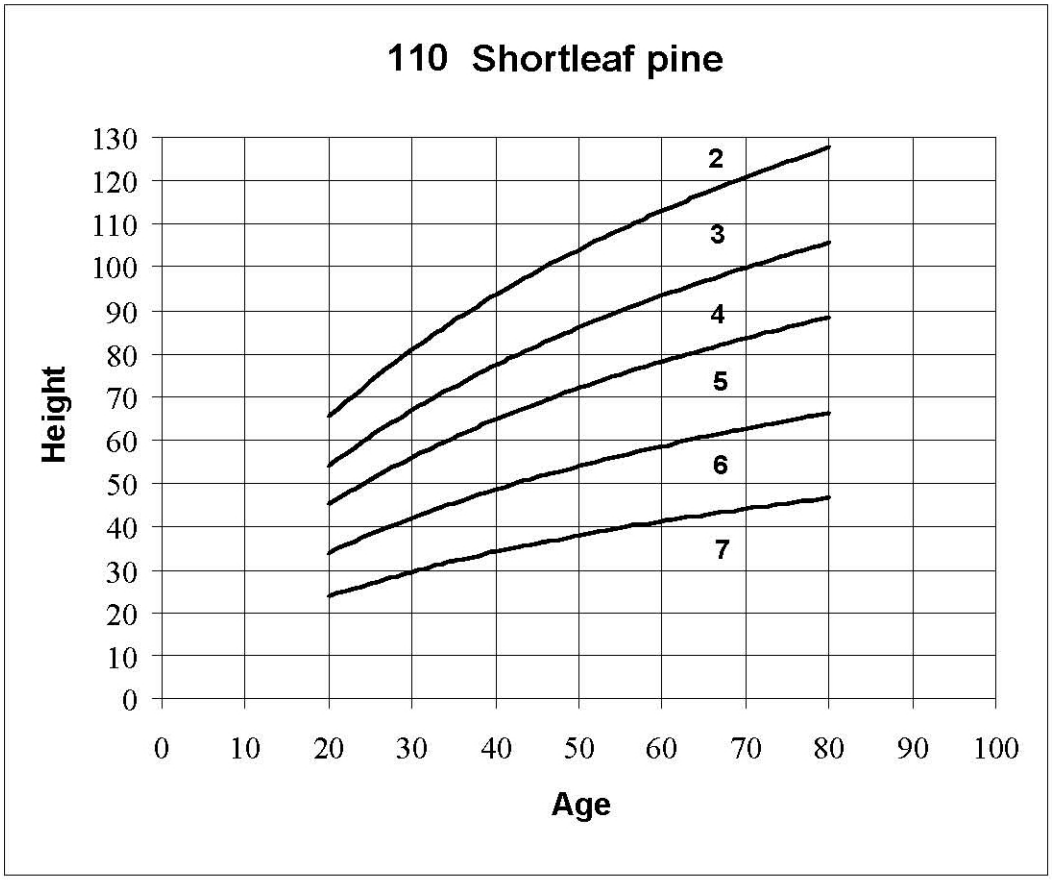
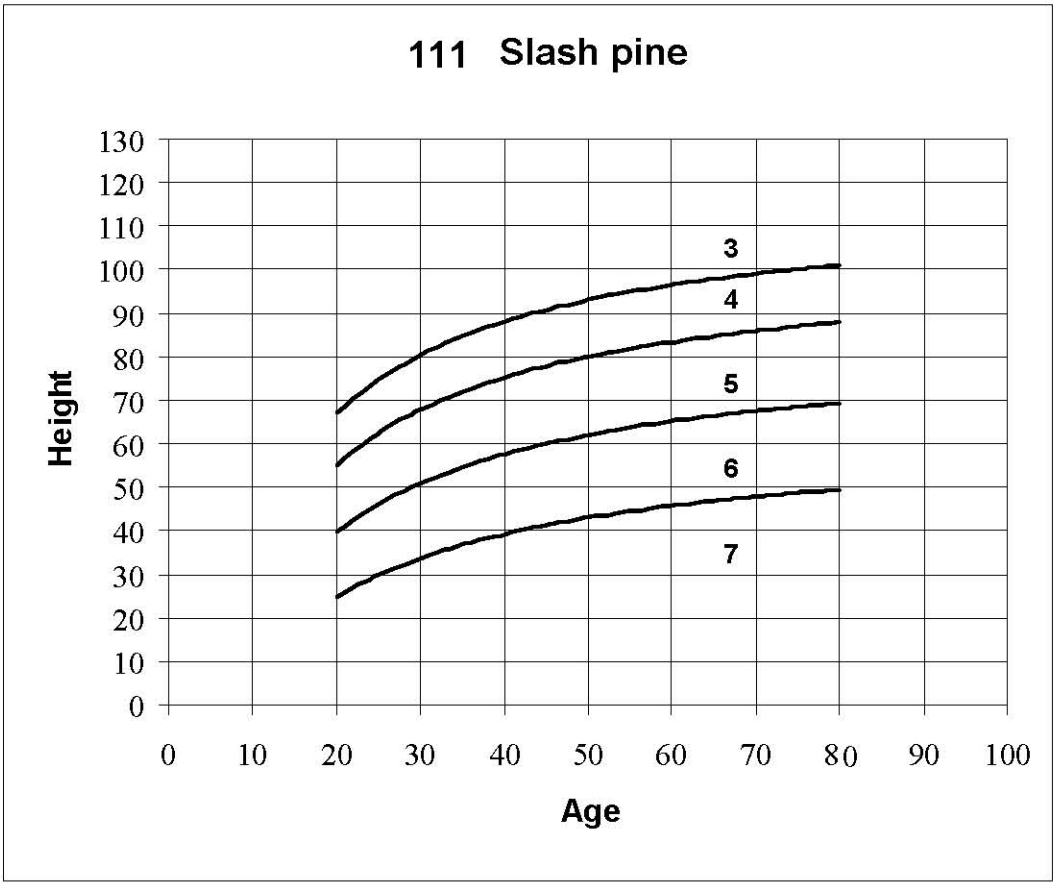
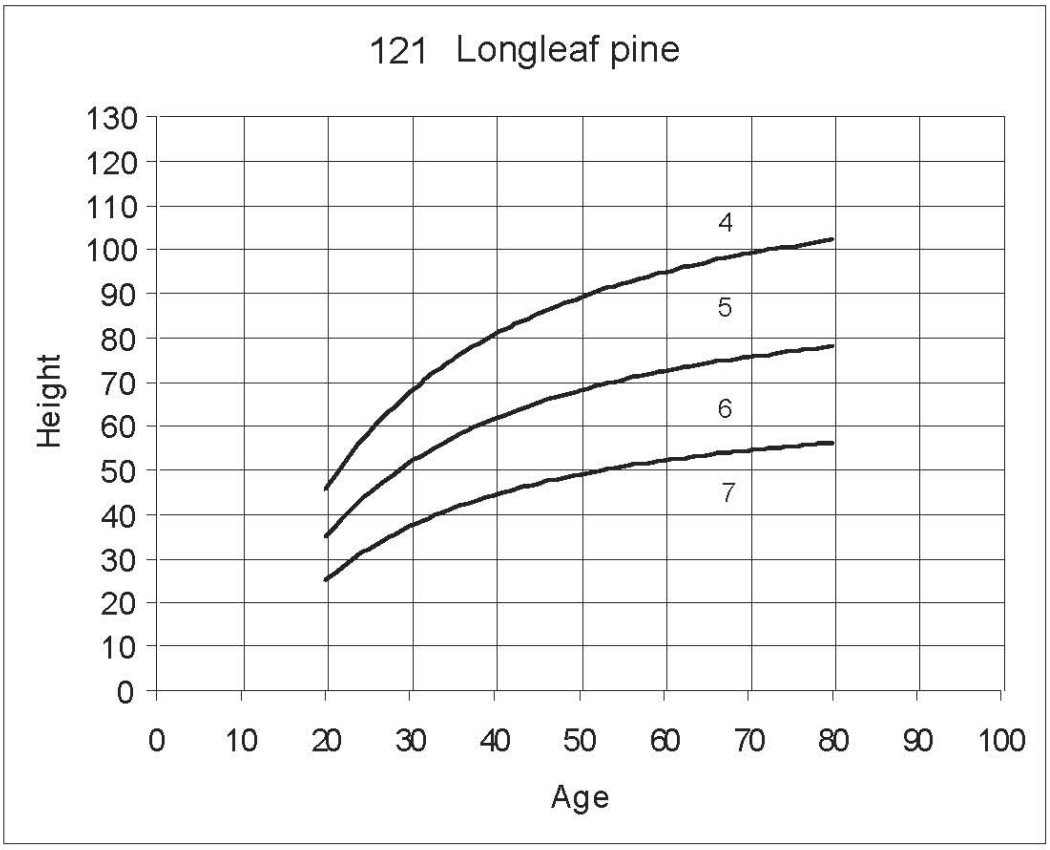
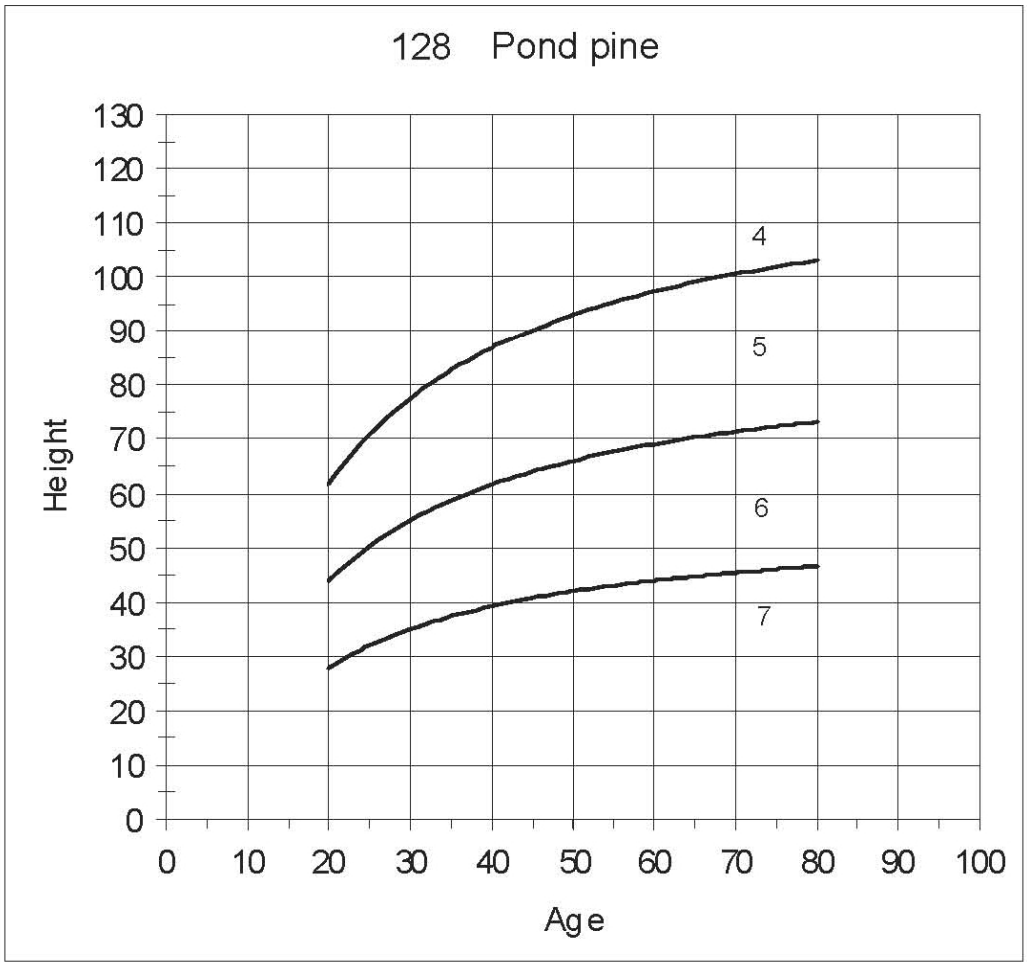
100
110
120
130


110 Shortleaf pine
Height
Age
2
3
4
5
6
7
0
10
20
30
40
50
60
70
80
90
100
110
120
130

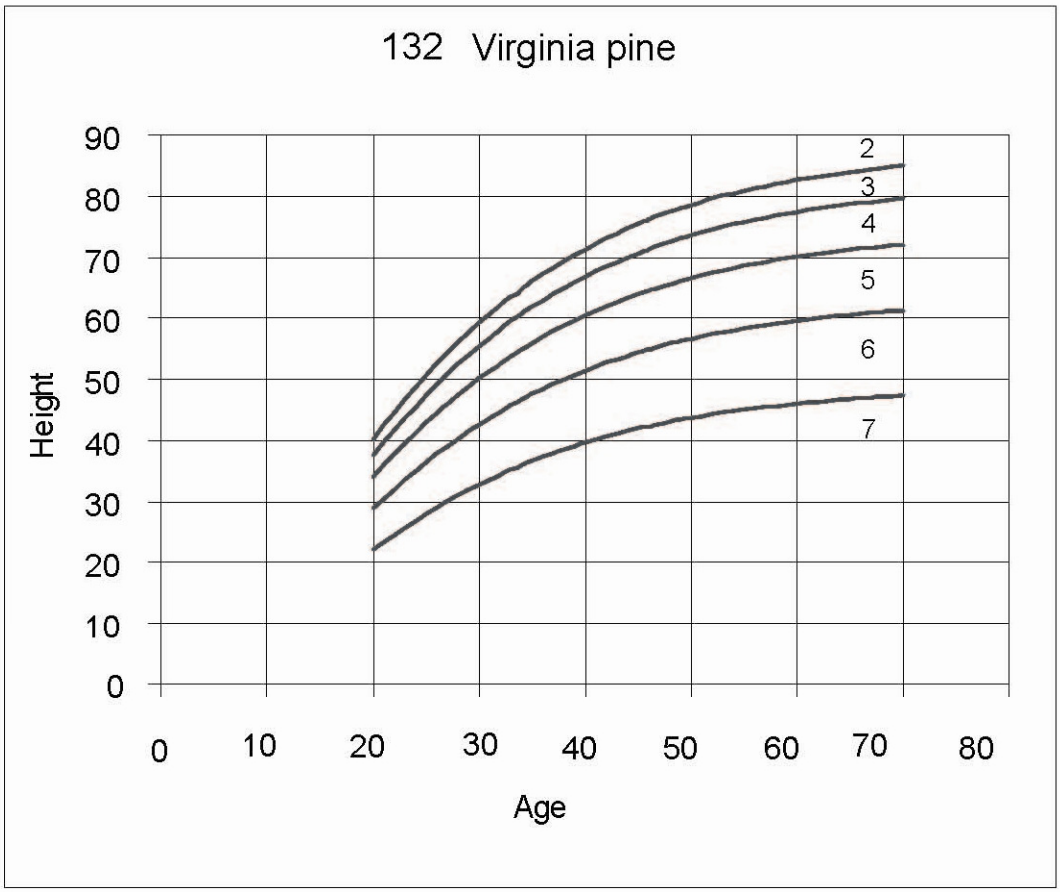

111 Slash pine
Height
Age
3
4
5
6
7
0
10
20
30
40
50
60
70
80
90
100
110
120
130


121 Longleaf pine
Height
Age
4
5
6
7
0
10
20
30
40
50
60
70
80
90
100
110
120
130


128 Pond pine
Height
Age
4
5
6
7
0
10
20
30
40
50
60
70
80
90
100
110
120
130


129 Eastern white pine
Height
Age
3
4
5
6
0
10
20
30
40
50
60
70
80
90
100
110
120
130


131 Loblolly pine
Height
Age
2
3
4
5
6
7
0
10
20
30
40
50
60
70
80
90
100
110
120
130


132 Virginia pine
Height
Age
0
10
20
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40
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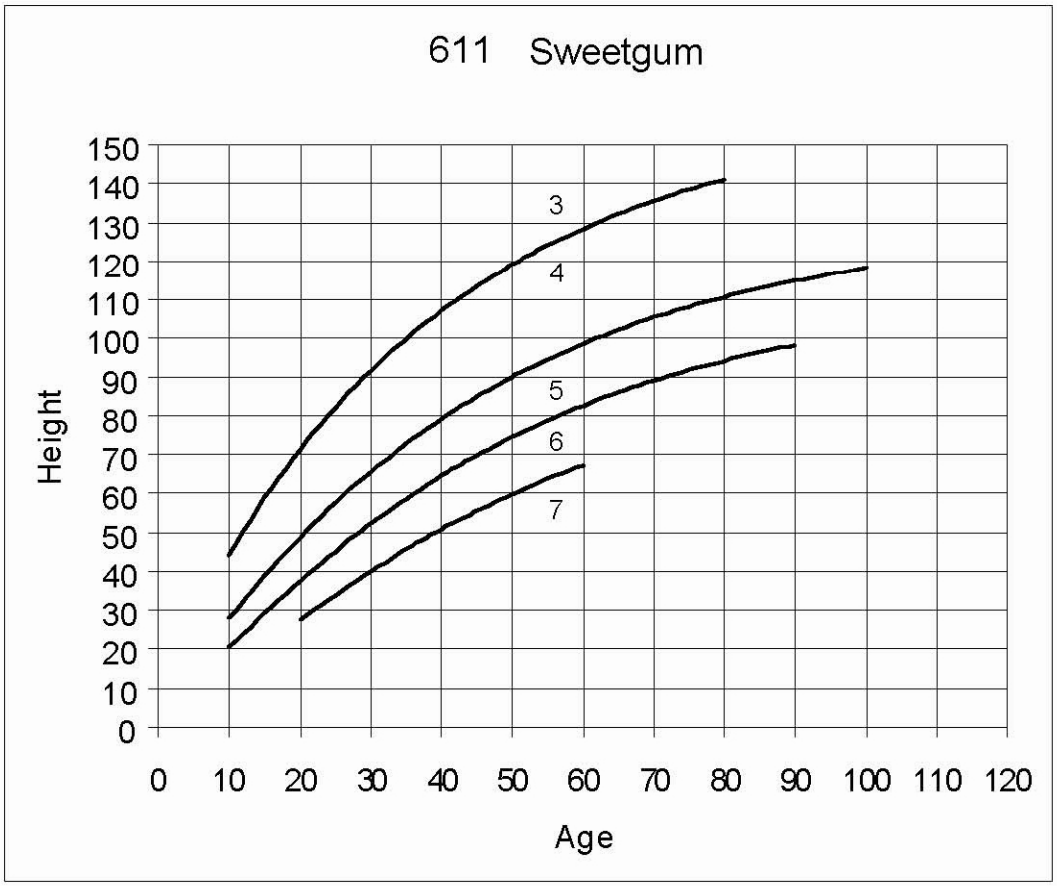
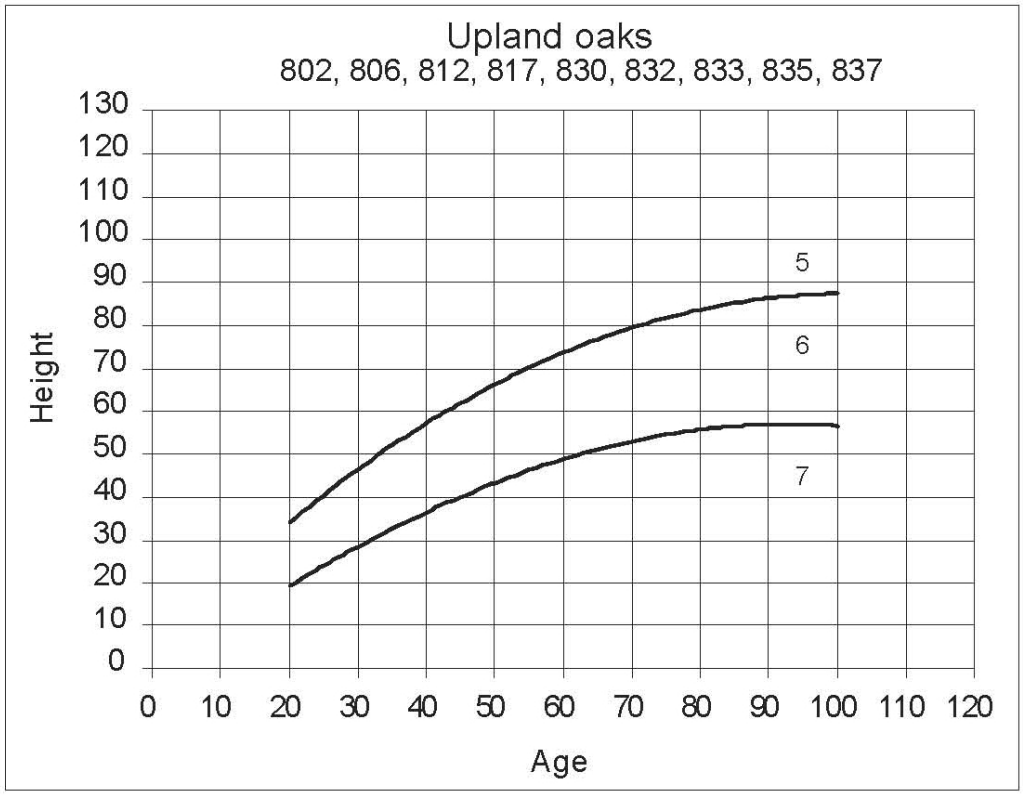
60
70
80
90
2
3
4
5
6
7


611 Sweetgum
Height
Age
0
10
20
30
40
50
60
70
80
90
100
110
120
130
140
150
3
4
5
6
7


Upland oaks
802, 806, 812, 817, 830, 832, 833, 835, 837
Height
Age
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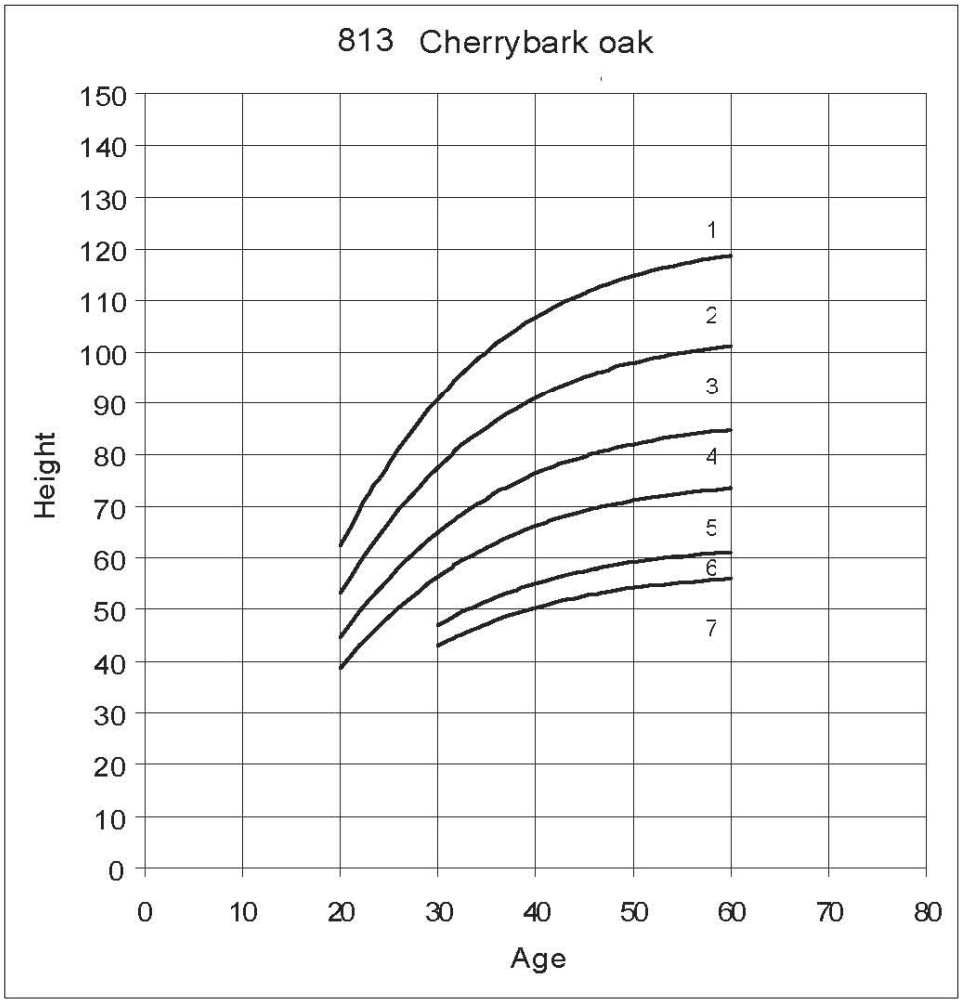
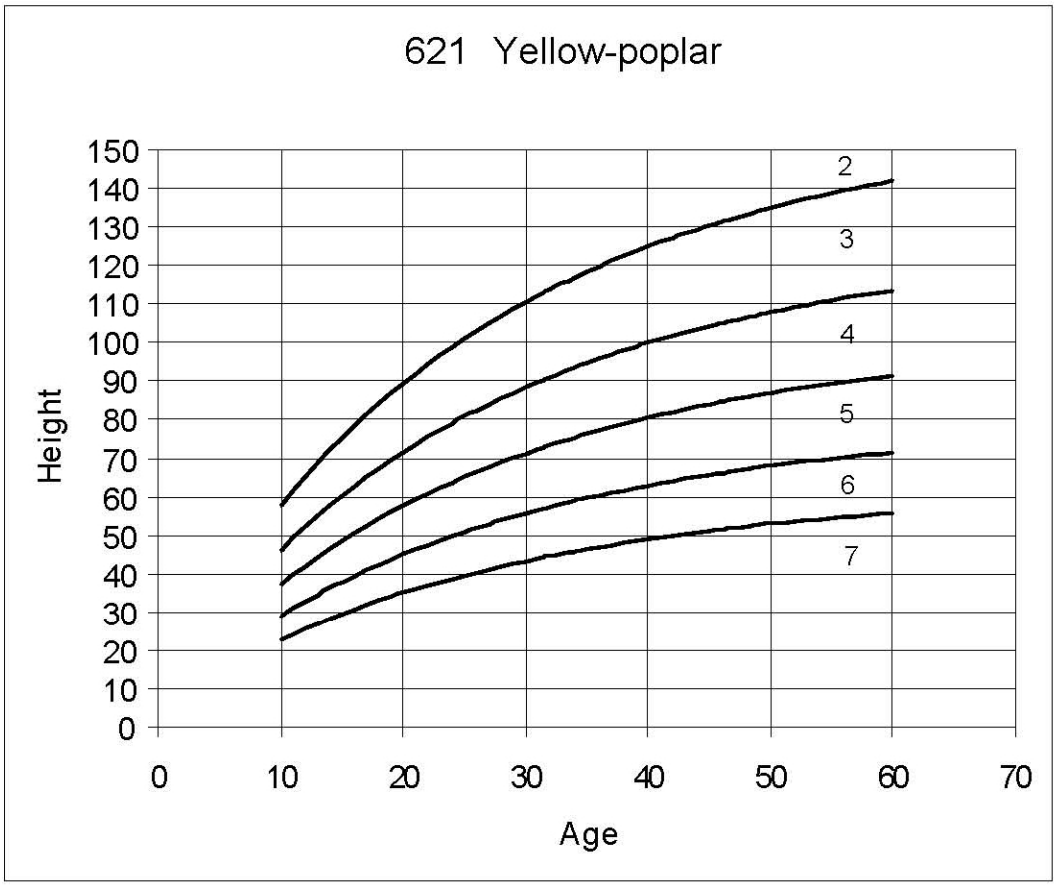
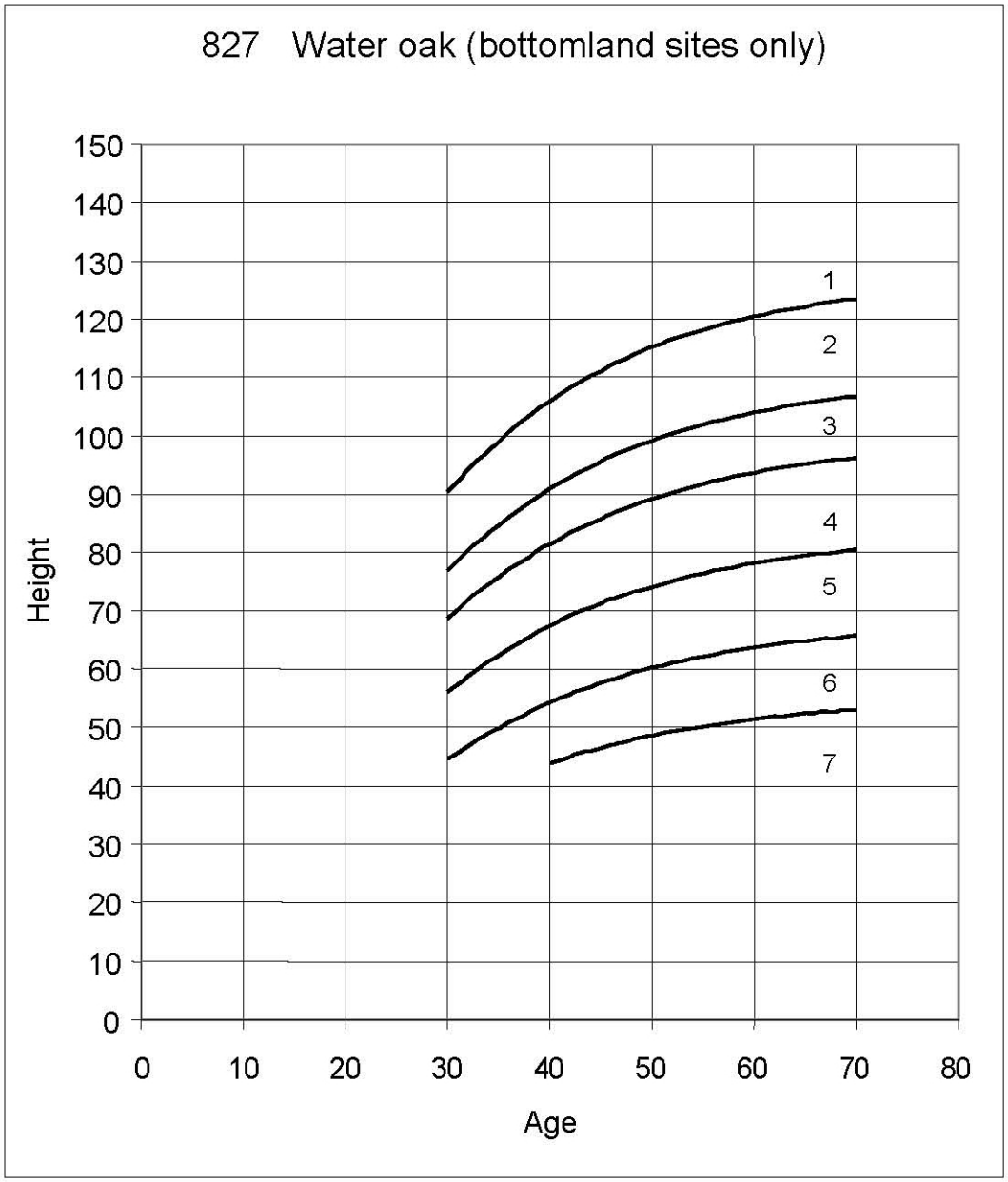
6
7
0
10
20
30
40
50
60
70
80
90
100
110
120
130


813 Cherrybark oak
Height
Age
1
2
3
4
5
6
7
0
10
20
30
40
50
60
70
80
90
100
110
120
130
140
150


621 Yellow-poplar
Height
Age
0
10
20
30
40
50
60
70
80
90
100
110
120
130
140
150
2
3
4
5
6
7


742 Cottonwood
Height
Age
0
10
20
30
40
50
60
70
80
90
100
110
1
2
3
4
5
6


827 Water oak (bottomland sites only)
Height
Age
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
0
0
10
20
30
40
50
60
70
80
1
2
3
4
5
6
7

Appendix 5. Determination of Stocking Values for Land Use Classification

Stocking Procedures for Southern Timberlands

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. Only tree species from Appendix 3 are used to determine stocking.

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 neded 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)
			Percent	
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.

The following table shows the number of trees required by DBH class to reach 10% stocking based on the size of the stocking plot installed.

		CIRCLE PLOT DIMENSIONS			
		118 FT RADIUS	83 FT RADIUS	59 FT RADIUS	48 FT RADIUS
		43560 SQ FT	21780 SQ FT	10890 SQ FT	7260 SQ FT
		1 ACRE	1/2 ACRE	1/4 ACRE	1/6 ACRE
		MINIMUM NUMBER OF TREES TALLIED NEEDED TO REACH 10% STOCKING			
DBH CLASS	SEEDLING	60	30	15	10
	2	56	28	14	9
	4	46	23	12	8
	6	34	17	9	6
	8	24	12	6	4
	10	16	8	4	3
	12	11	5	3	2
	14	9	4	2	2
	16	7	3	2	1
	18	6	3	2	1
	20	5	2	1	1
	COUNT FOR ALL TREES IN THIS TABLE IS BASED ON THE ENTIRE STOCKING PLOT.				
	SOUTHERN TIMBERLANDS ONLY NOT FOR WESTERN WOODLAND FORESTS.				

The following table shows the percent value required by DBH class to reach 10% stocking based on the size of the stocking plot installed.

		CIRCLE PLOT DIMENSIONS			
		118 FT RADIUS	83 FT RADIUS	59 FT RADIUS	48 FT RADIUS
		43560 SQ FT	21780 SQ FT	10890 SQ FT	7260 SQ FT
		1 ACRE	1/2 ACRE	1/4 ACRE	1/6 ACRE
		STOCKING PERCENT PER SINGLE TREE TALLIED TO REACH 10% STOCKING			
DBH CLASS	SEEDLING	0.17%	0.33%	0.67%	1.00%
	2	0.18%	0.36%	0.71%	1.11%
	4	0.22%	0.43%	0.87%	1.25%
	6	0.29%	0.59%	1.18%	1.67%
	8	0.42%	0.83%	1.67%	2.50%
	10	0.63%	1.25%	2.50%	3.33%
	12	0.91%	2.00%	3.64%	5.00%
	14	1.11%	2.50%	4.44%	5.00%
	16	1.43%	3.33%	5.71%	10.00%
	18	1.67%	3.33%	6.67%	10.00%
	20	2.00%	5.00%	8.00%	10.00%
	PERCENTAGE FOR ALL TREES IN THIS TABLE IS BASED ON THE ENTIRE STOCKING PLOT.				
	SOUTHERN TIMBERLANDS ONLY NOT FOR WESTERN WOODLAND FORESTS.				

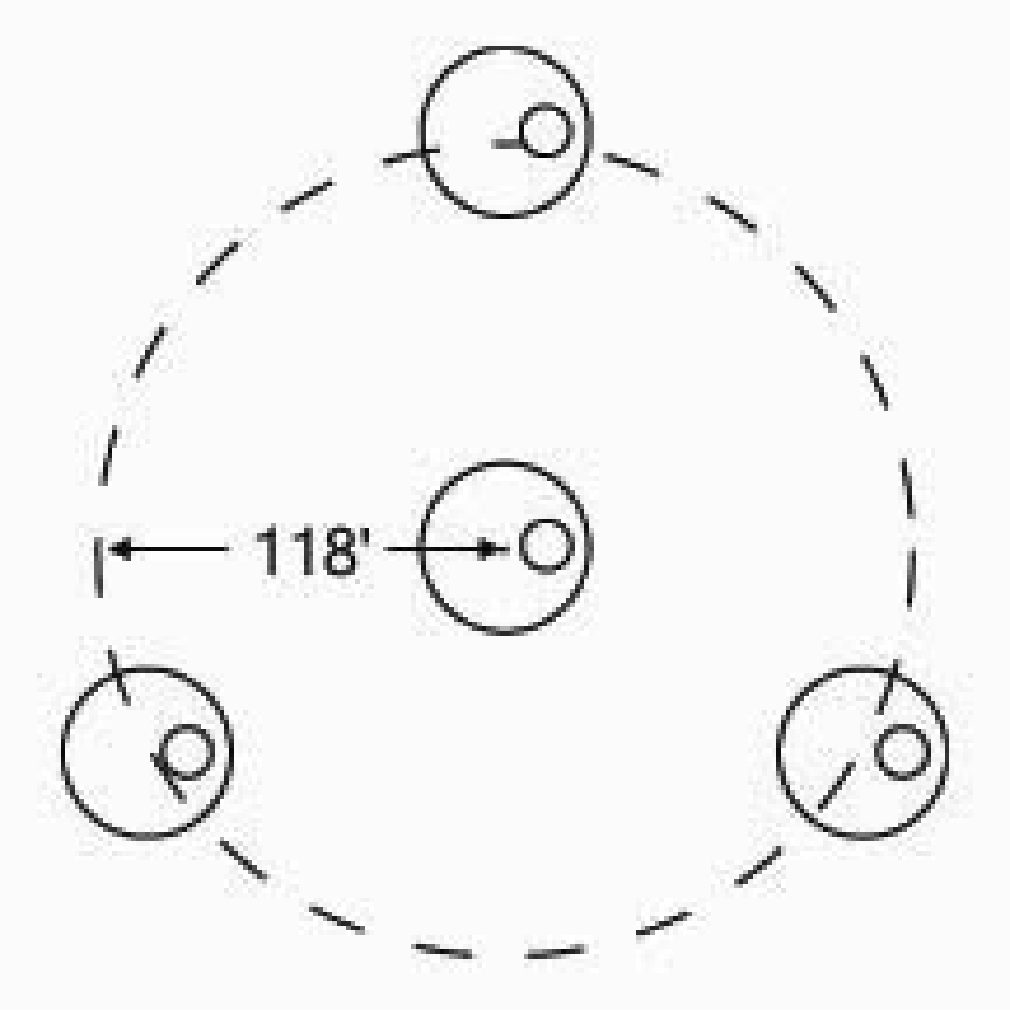
Stocking Procedures for Western Woodland

The procedures for determining stocking in a typical woodland area are not based on the basal area or the number of stems per acre. They are typically based on the percentage of crown cover. The minimum stocking level for a woodland condition is five percent crown cover over at least one acre.

Given:

- the area of an acre is 43,560 square feet,
- five percent of one acre is 2,178 sq. ft.
- a 1-acre circle has a radius of 117.8 ft.

To determine crown cover, a one-acre area surrounding plot center is sampled. Crown cover is determined based on the sum of the crown area of all individual trees within that 118' of plot center. Only tree species from Appendix 3 are used to determine cover. The total area of crown cover must equal 2178 sq. ft. for an area to have 5% crown cover.



To calculate crown cover, first determine the general shape of the crown. For crowns that are more circular, calculate the area using the radius of the circle ($\pi * r^2$). For crowns that are mostly square or rectangular, measure the length and width to calculate the square footage of the crown (length * width).

Assuming the crowns to be circles:

1. Measure the approximate crown diameter for each tree on the acre.
2. Calculate the crown area for each tree as CROWN AREA = (1/2 crown diameter)² X 3.14.
3. Add up the crown areas, then divide by the area of an acre (43,560); multiply by 100.

Assuming the crowns to be rectangles:
1. Measure the approximate length and width of the crown for each tree on the acre.
2. Calculate the crown area for each tree as CROWN AREA = length X width
3. Add up the crown areas, then divide by the area of an acre (43,560); multiply by 100

For example, there are 14 trees on the acre with the following dimensions:

Crowns as Circles:				**Crowns as Rectangles:**		
Tree #	**Crown Diameter**	**Area (πr^2)**		**Crown Length**	**Crown Width**	**Area (LxW)**
1	12	113		14	8	112
2	18	254		21	12	252
3	22	380		23	18	414
4	14	154		16	12	192
5	24	452		25	19	475
6	8	50		8	6	48
7	10	79		11	8	88
8	16	201	**or**	17	13	221
9	14	154		14	10	140
10	4	13		4	3	12
11	4	13		4	3	12
12	16	201		13	17	221
13	8	50		8	6	48
14	12	113		12	10	120
Total Crown:		**2,227**		**Total Crown:**		**2,355**
Percent of Acre:		**5.1%**		**Percent of Acre:**		**5.4%**

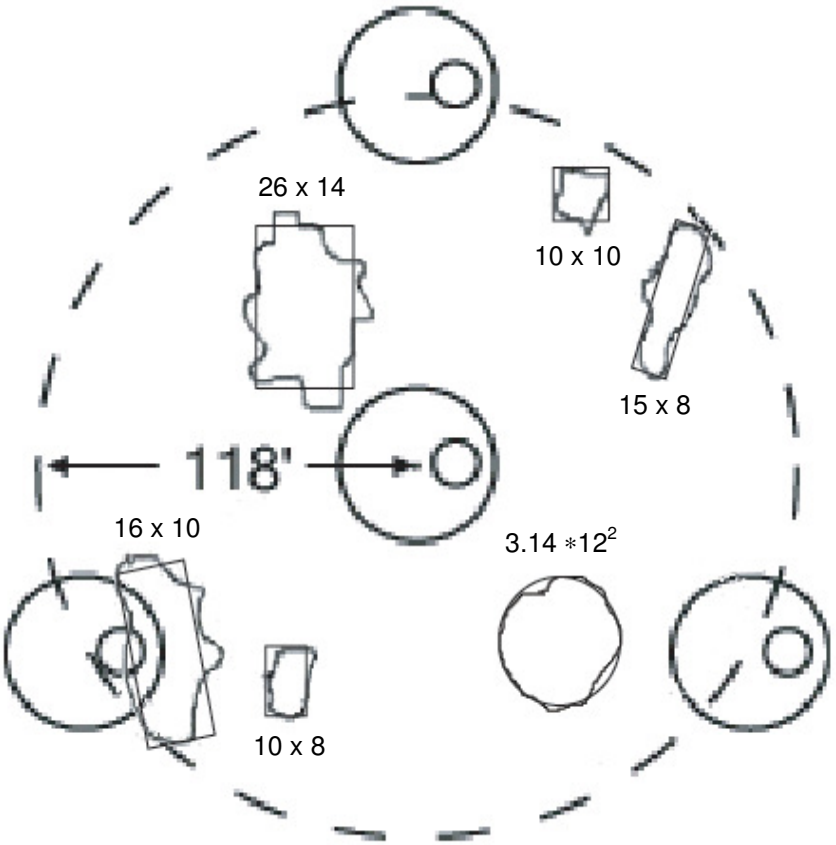
In each example, the minimum of 5% is met.

Example: The following plot illustration has six crowns to measure. Using the formula, the calculations are as follows:

26 x 14 = 364 sq. ft.
15 x 8 = 120 sq. ft.
10 x 8 = 80 sq. ft.
10 x 10 = 100 sq. ft.
16 x 10 = 160 sq. ft.
$3.14 * 12^2$ = 452 sq. ft.

The total crown cover is 1276 sq. ft.
(1276 sq. ft. / 43560 sq. ft.) * 100 = 2.9%

Since this is less than the minimum requirement, the condition is not stocked.



If the stand is composed only of seedlings and saplings, crews may look at stems per acre to determine stocking. In western woodland forests, the minimum number of seedlings or saplings needed to meet 10% is stocking is 40. Only tree species from Appendix 3 are used to determine stocking. This is to be used when the stand is comprised only of seedlings and saplings and is in a woodland forest type. The standard for southern forest types is 60 seedlings per acre.

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.

Ephermeral – A stream that flows only in direct response to precipitation or surface run-off.

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.

Intermittant – A stream that flows for protracted periods only when it receives ground water discharge or long-continued contributions from melting snow or other surface and shallow subsurface sources.

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 ¼ 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
General Description				
New Subplot Location	+/- 7 feet	at least 95% of the time	n/a	feet
New Microplot Location	+/- 1 foot	at least 95% of the time	n/a	feet
Plot Level Data				
STATE	No errors	at least 99% of the time	Appendix 1	n/a
COUNTY	No errors	at least 99% of the time	Appendix 1	n/a
PLOT NUMBER	No errors	at least 99% of the time	00001 to 99999	n/a
PLOT STATUS	No errors	at least 99% of the time	1 to 3	n/a
PLOT NONSAMPLED REASON	No errors	at least 99% of the time	01 to 03 and 05 to 11	n/a
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
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	4.01	n/a
YEAR	No errors	at least 99% of the time	≥ 2003	year
MONTH	No errors	at least 99% of the time	Jan – Dec (01 – 12)	month
DAY	No errors	at least 99% of the time	01 to 31	day
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
WATER ON PLOT	No errors	at least 90% of the time	0 to 5, 9	n/a
QA STATUS	No errors	at least 99% of the time	1 to 7	n/a
CREW NUMBER	No errors	at least 99% of the time	NRS 240001-249999 SRS 330001-339999 RMRS 220001-229999 PNW 260001-269999	n/a
GPS UNIT	No errors	at least 99% of the time	0 to 4	n/a
GPS SERIAL NUMBER	No errors	at least 99% of the time	000001 to 999999	n/a
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
LATITUDE MINUTES	No errors	at least 99% of the time	1 – 59	minutes
LATITUDE SECONDS	+/- 140 ft	at least 99% of the time	0.00 – 59.99	seconds
LONGITUDE DEGREES	No errors	at least 99% of the time	1-180	degrees
LONGITUDE MINUTES	No errors	at least 99% of the time	1 – 59	minutes
LONGITUDE SECONDS	+/- 140 ft	at least 99% of the time	0.00 – 59.99	seconds
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
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
GPS ELEVATION		at least 99% of the time	-00100 to 20000	feet
GPS ERROR	No errors	at least 99% of the time	000 to 999 071 to 999 if an error < 70 cannot be obtained	feet
NUMBER OF READINGS	No errors	at least 99% of the time	001 to 999	n/a
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
SRS CYCLE	No errors	At least 99% of the time	01 to 99	n/a
SRS SUBCYCLE	No errors	At least 99% of the time	1 to 5	n/a
SRS PHASE	No errors	At least 99% of the time	2, 3	n/a

Variable Name	Tolerance	MQO	Values	Units
SRS PLOT IN CORRECT COUNTY?	No errors	At least 99% of the time	0 or 1	n/a
SRS CORRECT COUNTY	No errors	at least 99% of the time	Appendix 1	n/a
SRS PAST YEAR	No errors	At least 99% of the time	≤ 2003	n/a
SRS PAST MONTH	No errors	At least 99% of the time	01 - 12	n/a
SRS PAST DAY	No errors	At least 99% of the time	01- 31	n/a
SRS NUMBER OF ACCESSIBLE FORESTLAND CONDITIONS	No errors	at least 99% of the time	0 to 9	n/a
SRS PLOT ACCESSIBILITY	No errors	at least 99% of the time	1-9	n/a
SRS GPS STATUS	No errors	At least 99% of the time	1, 8, 9	n/a
Condition Class Information				
CONDITION CLASS NUMBER	No errors	at least 99% of the time	1 to 9	n/a
CONDITION CLASS STATUS	No errors	at least 99% of the time	1 to 5	n/a
CONDITION NONSAMPLED REASON	No errors	at least 99% of the time	01, 02, 03, 10, 11	n/a
RESERVED STATUS	No errors	at least 99% of the time	0, 1	n/a
OWNER GROUP	No errors	at least 99% of the time	10, 20, 30, 40	n/a
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
STAND SIZE CLASS	No errors	at least 99% of the time	0 to 6	class
REGENERATION STATUS	No errors	at least 99% of the time	0, 1	n/a
TREE DENSITY	No errors	at least 99% of the time	1 to 3	n/a
OWNER CLASS	No errors	at least 99% of the time	11-13; 21-25; 31-33; 41-45	class
PRIVATE OWNER INDUSTRIAL STATUS	No errors	at least 99% of the time	0, 1	n/a
ARTIFICIAL REGENERATION SPECIES	No errors	at least 99% of the time	Appendix 3	n/a
STAND AGE	+/- 10%	at least 95% of the time	000 to 997, 998, 999	year
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
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
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
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
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
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
TREATMENT 1	No errors	at least 99% of the time	00, 10, 20, 30, 40, 50	n/a
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
TREATMENT 2	No errors	at least 99% of the time	00, 10, 20, 30, 40, 50	n/a
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
TREATMENT 3	No errors	at least 99% of the time	00, 10, 20, 30, 40, 50	n/a

Variable Name	Tolerance	MQO	Values	Units
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
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
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
SRS TRACT TOTAL ACRES	No errors	At least 99% of the time	00001- 99999	n/a
SRS TRACT PERCENT FOREST	No errors	At least 99% of the time	001- 100	n/a
SRS STAND STRUCTURE	No errors	At least 99% of the time	0 - 2	n/a
SRS OPERABILITY	No errors	At least 99% of the time	0 - 6	n/a
SRS CONDITION SITE CLASS	+/- 1 class	At least 99% of the time	0 - 7	n/a
SRS FIRE	No errors	At least 99% of the time	0,1	n/a
SRS GRAZING	No errors	At least 99% of the time	0,1	n/a
SRS CUTTING TYPE 1, 2, 3	No errors	At least 99% of the time	11-16	n/a
CANOPY COVER SAMPLE METHOD	No errors	At least 90% of the time	1 to 4	n/a
LIVE CANOPY COVER	0 – 12% - No errors 13 – 20% - 10% error 21 – 100% - 25% error	At least 99% of the time	00 - 99	percent
LIVE MISSING CANOPY COVER	0 – 12% - No errors 13 – 20% - 10% error 21 – 100% - 25% error	At least 80% of the time	00 - 99	percent
TOTAL STEMS	10%	At least 90% of the time	00000 – 99999	n/a
Subplot Information				
SUBPLOT NUMBER	No errors	at least 99% of the time	1 to 4	n/a
SUBPLOT/ MACROPLOT STATUS	No errors	at least 99% of the time	1 to 4	n/a
SUBPLOT NONSAMPLED REASON	No errors	at least 99% of the time	01 to 05, 10, 11	n/a
SUBPLOT CENTER CONDITION	No errors	at least 99% of the time	1 to 9	n/a
MICROPLOT CENTER CONDITION	No errors	at least 99% of the time	1 to 9	n/a
SUBPLOT SLOPE	+/- 10 %	at least 90% of the time	000, 005 to 155	percent
SUBPLOT ASPECT	+/- 10 degrees	at least 90% of the time	000 to 360	degrees
SNOW/WATER DEPTH	+/- 0.5 ft	at the time of measurement	0.0 to 9.9	feet
SUBPLOT/ MACROPLOT CONDITION LIST	No errors	at least 99% of the time	1000 to 9876	n/a
SRS NONNATIVE INVASIVE PEST PLANTS	No errors	At least 90% of the time	0000, see section 3.10	n/a
SRS NONNATIVE INVASIVE PEST PLANT % COVER	No errors	At least 90% of the time	1 - 5	n/a
Boundary Data				
SUBPLOT NUMBER	No errors	at least 99% of the time	1 to 4	n/a
PLOT TYPE	No errors	at least 99% of the time	1 to 4	n/a
BOUNDARY CHANGE	No errors	at least 99% of the time	0 to 3	n/a
CONTRASTING CONDITION	No errors	at least 99% of the time	1 to 9	n/a
LEFT AZIMUTH	+/- 5 degrees	at least 90% of the time	001 to 360	degrees
CORNER AZIMUTH	+/- 5 degrees	at least 90% of the time	000 to 360	degrees
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
RIGHT AZIMUTH	+/- 5 degrees	at least 90% of the time	001 to 360	degrees
SRS BOUNDARY STATUS	No errors	At least 99% of the time	0, 1 or 2	n/a
Tree and Sapling Data				
SUBPLOT NUMBER	No errors	at least 99% of the time	1 to 4	n/a
TREE RECORD NUMBER	No errors	at least 99% of the time	000, 001 to 999	n/a

Variable Name	Tolerance	MQO	Values	Units
CONDITION CLASS NUMBER	No errors	at least 99% of the time	1 to 9	n/a
AZIMUTH	+/- 3 degrees	at least 90% of the time	001 to 360	degrees
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
PREVIOUS TREE STATUS	No errors	at least 95% of the time	1, 2	n/a
PRESENT TREE STATUS	No errors	at least 95% of the time	0 to 3	n/a
RECONCILE	No errors	at least 95% of the time	1 to 4: valid for new trees on the plot 5 to 9: valid for remeasured trees that no longer qualify as tally	n/a
STANDING DEAD	No errors	At least 99% of the time	0, 1	n/a
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
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 +/- 0.5 inch per 20.0 inch increment of measured diameter when a wedge or pentaprism is used for all trees; and estimated diameters trees ≥ 5.0 in diameter For woodland species: +/- 0.2 inch per stem	at least 95% of the time	001.0 to 999.9	inches
DRC STEM DIAMETER	+/- 0.2 inch per stem	at least 95% of the time	001.0 to 999.9	inch
DRC STEM STATUS	No errors	at least 95% of the time	1, 2	n/a
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
DIAMETER CHECK	No errors	at least 99% of the time	0 to 2	n/a
ROTTEN / MISSING CULL	+/- 10%	at least 90% of the time	00 to 99	percent
TOTAL LENGTH	+/- 10% of true length	at least 90% of the time	005 to 400	feet
ACTUAL LENGTH	+/- 10% of true length	at least 90% of the time	005 to 400	feet
LENGTH METHOD	No errors	at least 99% of the time	1 to 3	n/a
CROWN CLASS	No errors	at least 85% of the time	1 to 5	n/a
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
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*

Variable Name	Tolerance	MQO	Values	Units
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
MORTALITY YEAR	*+/- 1year for 5-year measure. cycles +/- 2years for > 5-year measure. cycles*	*at least 70% of the time*	*1994 or higher*	*year*
DECAY CLASS	+/- 1 class	at least 90% of the time	1 to 5	class
LENGTH TO DIAMETER MEASUREMENT POINT	*+/- 0.2 ft*	*at least 90% of the time*	*00.1 to 15.0*	*feet*
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
SRS TREE CLASS	No errors	At least 90% of the time	2, 3, 4	n/a
SRS TREE GRADE	No errors	At least 90% of the time	1 to 5	n/a
PERCENT BOARD FOOT CULL	+/- 10%	At least 90% of the time	00 - 67	percent
SRS DISEASE	No errors	At least 80% of the time	0, 1, 2	n/a
SRS DIEBACK SEVERITY	+/- 1 class	At least 80% of the time	1 to 9	Class
SRS UTILIZATION CLASS	No errors	At least 99% of the time	1, 2	n/a
SRS SPECIES CODE	No errors	At least 99% of the time	00 - 04	n/a
SRS ABNORMAL TERMINATION	No errors	at least 99% of the time	0, 1	n/a
SRS CARIBBEAN SPECIES	No errors	At least 99% of the time for genus, at least 95% of the time for species	Appendix 3	n/a
Seedling Data				
SUBPLOT NUMBER	No errors	at least 99% of the time	1 to 4	n/a
SPECIES	No errors	at least 90% of the time for genus at least 85% of the time for species	Appendix 3	n/a
CONDITION CLASS NUMBER	No errors	at least 99% of the time	1-9	n/a
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
Site Tree Information				
CONDITION CLASS LIST	No errors	at least 99% of the time	1000 to 9876	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
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
SITE TREE LENGTH	+/- 10% of true length	at least 90% of the time	005 to 999	feet
TREE AGE AT DIAMETER	+/- 5 years	at least 95% of the time	001 to 999	year
SITE TREE NOTES	n/a	n/a	English, language words, phrases and numbers	n/a
SUBPLOT NUMBER	*No errors*	*at least 99% of the time*	*1 to 4*	*n/a*
AZIMUTH	*+/- 10 degrees*	*at least 90% of the time*	*001 to 360*	*degrees*
HORIZONTAL DISTANCE	*+/-5 ft*	*at least 90% of the time*	*000.1 to 200.0*	*feet*
SRS SITE CLASS	+/- 1 class	At least 99% of the time	0 - 7	n/a

Note: The regional column entitled “Factor” has been removed from this table and will be found in the *QA / QC Scoring Manual for Check Cruising.*

Appendix 8. Tree Coding Guide

Previous Measurement	Present Measurement	PREVIOUS TREE STATUS	PRESENT TREE STATUS	RECONCILE	Standing Dead	CAUSE OF DEATH
SAMPLE KIND 1 or 3						
	Live 1.0+DBH/DRC		1			
	Dead 5.0+ DBH/DRC		2			
SAMPLE KIND 2 (Remeasure)						
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 **or** 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	

Previous Measurement	Present Measurement	PREVIOUS TREE STATUS	PRESENT TREE STATUS	RECONCILE	Standing Dead	CAUSE OF DEATH
Dead 5.0+ DBH/DRC	Tree removed (cut and hauled away)	2	3			
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		
Live 1.0+ DBH/DRC	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		
Dead 5.0 DBH/DRC	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 and Tables

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).

Cubic-Foot Volume of Short Logs

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).

Board-Foot Volume of Short Logs										
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

CUBIC FOOT VOLUME OF SHORT LOGS										
D.I.B. Mid-point	LENGTH OF LOG OR SECTION (FT.)									
	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	2.1	3.1	4.7	6.3	7.9	9.4	11	13
14	1.1	2.1	3.2	4.3	6.4	8.6	11	13	15	17
16	1.4	2.8	4.2	5.6	8.4	11	14	17	20	22
18	1.8	3.5	5.3	7.1	11	14	18	21	25	28
20	2.2	4.4	6.5	8.7	13	18	22	26	30	35
22	2.6	5.3	7.9	11	16	21	26	32	37	42
24	3.1	6.3	9.4	13	19	25	31	38	44	50
26	3.7	7.4	11	15	22	30	37	44	52	59
28	4.3	8.6	13	17	26	34	43	51	60	68
30	4.9	9.8	15	20	30	39	49	59	69	78
32	5.6	11	17	22	34	45	56	67	78	89
34	6.3	13	19	25	38	50	63	76	88	101
36	7.1	14	21	28	42	56	71	85	99	113
38	7.9	16	24	32	47	63	79	94	110	126
40	8.7	18	26	35	52	70	87	105	122	140

PERCENT BOARD-FOOT CULL OF *HARDWOOD SAWTIMBER* BY 4-FT. SECTION & LOCATION IN THE TREE

LOG (FT)		1st	2nd	3nd	4th	5th	6th	7th	8th	9th	10th	11th	12th	13th	14th	15th	16th
1	(16)	29	26	24	21												
1 ½	(24)	19	18	16	16	16	15										
2	(32)	15	14	13	13	12	12	11	10								
2 ½	(40)	12	12	11	11	10	10	9	9	8	8						
3	(48)	12	10	10	9	9	9	8	7	7	7	6	5				
3 ½	(56)	10	10	9	9	9	8	8	7	7	6	5	5	4	3		
4	(64)	9	9	9	8	8	7	7	7	6	6	5	5	4	4	3	3

PERCENT BOARD-FOOT CULL OF *SOFTWOOD SAWTIMBER* BY 4-FT. SECTION & LOCATION IN THE TREE

LOG (FT)		1st	2nd	3nd	4th	5th	6th	7th	8th	9th	10th	11th	12th	13th	14th	15th	16th
1	(16)	33	27	21	19												
1 ½	(24)	26	20	16	15	12	11										
2	(32)	21	17	14	12	10	9	9	8								
2 ½	(40)	19	15	12	10	9	8	7	7	7	6						
3	(48)	16	13	11	10	8	7	7	6	6	6	5	5				
3 ½	(56)	13	12	10	9	7	7	6	6	6	5	5	5	5	4		
4	(64)	10	9	9	8	7	7	6	6	6	5	5	5	5	4	4	4

PERCENT OF CUBIC-FOOT CULL VOLUME FOR *ALL TREES* BY 4-FT. SECTION & LOCATION IN THE TREE

HEIGHT (FT)	1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th	11th	12th	13th	14th	15th	16th	17th	18th
8	57	43																
12	42	32	26															
16	30	26	23	21														
20	26	23	21	19	11													
24	24	21	18	17	10	10												
28	21	19	17	16	10	9	8											
32	20	18	16	14	10	8	7	7										
36	19	16	14	13	9	8	8	7	6									
40	17	15	13	12	9	8	7	7	6	6								
44	16	14	12	11	9	7	7	7	6	6	5							
48	15	13	12	10	8	7	7	6	6	6	5	5						
52	14	12	11	9	8	7	6	6	6	6	5	5	5					
56	13	11	10	9	8	6	6	6	6	6	5	5	5	4				
60	12	11	10	9	7	6	6	6	6	5	5	5	5	4	4			
64	11	10	9	9	7	6	6	6	5	5	5	5	5	4	4	4		
68	10	10	9	8	6	6	6	5	5	5	5	5	4	4	4	4	4	
72	10	9	9	8	6	6	6	5	5	5	4	4	4	4	4	4	4	4

TREE SIZE		VOLUME DISTRIBUTION									
BOLT 8'	LOG 16'	BOLT NUMBER									
		1	2	3	4	5	6	7	8	9	10
		-------PERCENT OF THE TREE VOLUME-------									
2	1	56	44								
3	1 ½	41	33	26							
4	2	33	28	22	17						
5	2 ½	27	23	19	17	14					
6	3	24	21	18	15	12	10				
7	3 ½	22	19	17	14	12	9	7			
8	4	20	18	15	13	11	9	8	6		
-	5	18	15	13	12	10	9	8	6	5	3

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
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

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[a] (ft)	Best 12	Best 12	Best 12
Minimum DBH (in)	16[b]	13	11
Minimum DIB at the top of the grading section (in)	13[b] 16 20	11[c] 12	8
Clear cuttings on 3rd best face[d] minimum length (ft) number on face (max) yield in face length (min)*	 7 5 3 2 5/6	 3 3 2 3 4/6	 2 unlimited 3/6
Cull deduction, including crook and sweep but excluding shake, maximum w/in grading section (%)	9	9[e]	50

[a] 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.

[b] In basswood and ash, DIB at the top of the grading section may be 12-in and DBH may be15-in.

[c] 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.

[d] 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.

[e] 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

On naturally swelled-butted trees (e.g., water tupelo, swamp tupelo, Carolina ash), TREE GRADE is determined 3.5 feet below the recorded LENGTH TO DIAMETER MEASUREMENT POINT. This point is the base of the butt log.

On naturally swelled-butted trees (e.g., water tupelo, swamp tupelo, Carolina ash), cull is determined 3.5 feet below the recorded LENGTH TO DIAMETER MEASUREMENT POINT. This point is the base of the butt log. No cull is assessed below this point.

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[a] 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[b]	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.

[a] 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.

[b] 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.

Knots and limbs should be measured at the point where they would normally be trimmed from the main stem. This procedure is in contrast to footnote “a” in the grading table.

The presence of a crack or seam within the grading section is not allowed in grade 4. This type of surface defect is an indication of interior rot. Grade 4 does not allow unsound surface defects that may extend into the log as described in footnote “b” in the grading table.

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 SURFACE ABNORMALITIES THAT ARE HARDWOOD TREE GRADING DEFECTS

Log abnormalities that are defects in factory logs include the following:

- Adventitious bud clusters
- Bulge, butt or stem
- High bumps
- Burl
- Butt scar
- Canker
- Conk
- Flutes, if not superficial
- Holes extending into the bole
- Embedded metal (fence)
- Limb
- Knots
- Knot overgrowths
- Low bumps
- Overgrowths following insect damage or bird peck*
- Seams, if not superficial
- Wounds extending into the bole

Abnormalities not ordinarily limiting cuttings are butt swell, flanges and surface rise.

Hardwood Tree Grading Defects Defined --

Bark distortions – Many log surface abnormalities appear to be only breaks in the normal bark pattern. Overgrown knots, mechanical wounds, holes of all types, ingrown bark, and bird peck are typical defects under bark distortions which can be definitely established from bark appearance. They are all grading defects. A slight bark distortion consisting of a simple horizontal break across the normal bark pattern is not a grading defect.

Bulge – A general enlargement of a section of the log and a sign of internal rot.

Bump – Bumps usually indicate overgrown knots or other defects. Surface swells (less than 1” rise in 12” of length) can be disregarded as a grading defect.

Burls – A sound, hard, woody protuberance on the log with no protruding limbs, etc.

Butt scar – Damage at the base of the tree. Scars of recent origin are usually associated with a limited amount of rotten or stained wood. Severe rot is usually associated with older scars. If the scar extends into the log beyond the slab section, the area involved is a grading defect.

Bird peck – There must be four bird pecks within a square foot to affect the tree grade and be considered a defect. 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.

Canker – A definite, relatively localized lesion, primarily of bark and wood.

Conk – It is the fruiting body of a wood rotting fungus located on the bole of the tree and is an indication of serious internal rot.

Epicormic branches and dormant bud clusters – Epicormic branches are found on the main stem. Dormant bud clusters may develop on the main stem any time during the life of a tree.

Holes – All holes extending into or past the cambium on hardwood trees are grading defects.

Knots – Cut or broken-off limbs or sprout branches, green or dead, protruding, flush or depressed but with exposed sound or rotten wood.

Metal – Logs suspected of or know to contain metal should either be jump-butted (i.e., a qualifiying grading section is above the metal within the first 16-ft of the butt log) or rejected (i.e., butt log is cull). All metal (except aluminum research tags and nails) is considered an unsound grading defect.

Rot – Wood which has decayed to the point where it is useless.

Seams – Seams are cracks or splits running with the grain for part of or full length of the log. They are generally caused by wind, lightning or frost and extend from the bark to the center of the log. They may be open or completely healed. They are very damaging and especially so when they run spirally around the log.

- No clear cuttings can be taken on a log face that includes a full-length straight seam or a spiral seam. However, one straight seam can be placed on the edge of one face and ignored. This fixes the location of all other defects.

- All seams have cull associated with it and the estimation of cull will need to be determined before the final grade is assigned.

Wounds – Wounds or injuries that expose sapwood and/or heartwood are defects. The following are a few guidelines for wounds:

- Old wounds are commonly associated with stain, decay, and/or insects and the affected area becomes a defect.

- New “fresh” wounds (less than 1 year old) are disregarded as long as deterioration is not visible.

- If new or old wounds look superficial, disregard them.

Source: Official Grading Rules for Northern Hardwood and Softwood Logs and Tie Cuts (Effective Sept. 1, 1998).

SOUTHERN PINE TREE GRADES

SOUTHERN PINE TREE GRADES All pines except eastern white pine. Includes eastern redcedar and cypress.			
FACE LENGTH	**GRADE 1**	**GRADE 2**	**GRADE 3**
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 ex tends 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 that extends into or past the cambium. 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.

On naturally swelled-butted trees (e.g., baldcypress and pondcypress), TREE GRADE is determined 3.5 feet below the recorded LENGTH TO DIAMETER MEASUREMENT POINT. This point is the base of the butt log.

On naturally swelled-butted trees (e.g., baldcypress and pondcypress), cull is determined 3.5 feet below the recorded LENGTH TO DIAMETER MEASUREMENT POINT. This point is the base of the butt log. No cull is assessed below this point.

SOUTHERN PINE TREE GRADE 5

Record TREE GRADE 5 for southern pine species group 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[1]. (In addition, knots on balance of faces shall not exceed size limitations for Grade 2 sections.)	NO GOOD FACES REQUIRED. Maximum diam-eter of knots on 3 best faces: **SOUND RED KNOTS** not to exceed 1/6 of scaling diameter or 3-in maximum[2]. **DEAD OR BLACK KNOTS**, in-cluding over-grown knots, not to exceed 1/12 scaling diameter and 1-1/2-in maximum.	NO GOOD FACES REQUIRED. Maximum diam-eter of knots on 3 best faces: **SOUND RED KNOTS** not to exceed 1/3 of scaling diameter of 5-in maximum[2]. **DEAD OR BLACK KNOTS**, in-cluding over-grown knots, not to exceed 1/6 scaling dia-meter 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[3]:

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, de-grade the tree grade one below the section grade[3]. Otherwise the tree grade is the same as the final section grade.

[1] Trees under 16-in DBH require four full length good faces.
[2] Scaling diameter is estimated at the top of the 16-ft grading section.
[3] No tree will be designated below Grade 4 unless net tree scale is less than one-third of gross tree scale.

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%.

White Pine Collar Diameter Limits for Red & Black Knots			
Scaling Diameter (DIB in)	**Black Knots 1/12**	**Black & Red Knots 1/6**	**Red Knots 1/3**
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"	**2-1/2" Black Max**	**5" Max**
16	1-1/3"	2-2/3"	**5" Max**
17	1-5/12"	2-5/6"	**5" Max**
18	**1-1/2" Max**	**3" Red Max**	**5" Max**

Red knots – 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.

Dead or black knots – Visible branches, stubs or sockets that do not conform to the definition of red knots.

Overgrown knots – Identified by a distinctive circular/elliptical pattern in the bark and are treated the same as dead knots.

Average diameter of red and black knots on white pine – Measured at the point where the limb would normally be trimmed from the main stem. For red knots measure only the heartwood portion of the knot. For black knots measure the whole limb.

SPRUCE, FIR, CEDAR (excluding eastern redcedar) TAMARACK AND HEMLOCK

SPRUCE, FIR, CEDAR, TAMARACK AND HEMLOCK				
Minimum Merchantability Specifications for Grade 1				
DIB (small end of log)	**Length (2-ft multiples w/o trim)**	**Total Deduction**	**Sweep Permitted**	**Other Requirements***
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%.

Supplement B. Miscellaneous Tables

Instructions: Attach logger's tape to tree as if measuring for horizonatal distance (center of tree not face). Using the prism, align the bole segment with the main bole (i.e., borderline). When the boles are borderline, check the distance on the logger's tape. Find the distance in the table and record the corresponding diameter (e.g., 37.1 ft = 26.1 in diameter). These diameters are to be considered as "measured accurately" and not estimated. See illustration on page 298.

37.5 FACTOR PRISM ONLY!

TABLE OF VARIABLE PLOT LIMITING DISTANCE RADII / SLOPE = 0

USE TABLE WITH PRISM TO DETERMINE DIAMETER

<<< 37.5 BAF PRISM >>>

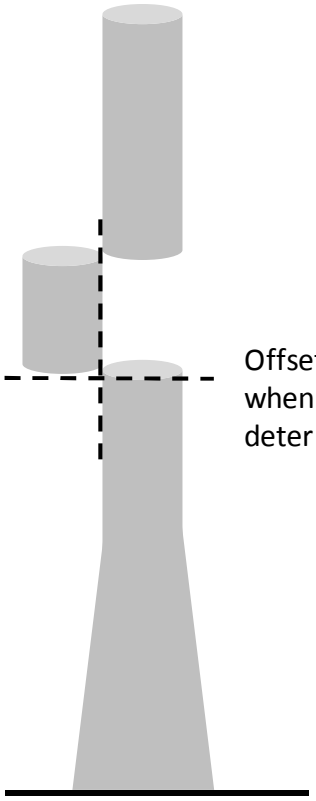
DBH	Tenths of Inch									
	0	1	2	3	4	5	6	7	8	9
	----------Distance in Feet----------									
5	7.1	7.2	7.4	7.5	7.7	7.8	8.0	8.1	8.2	8.4
6	8.5	8.7	8.8	9.0	9.1	9.2	9.4	9.5	9.7	9.8
7	9.9	10.1	10.2	10.4	10.5	10.7	10.8	10.9	11.1	11.2
8	11.4	11.5	11.6	11.8	11.9	12.1	12.2	12.4	12.5	12.6
9	12.8	12.9	13.1	13.2	13.4	13.5	13.6	13.8	13.9	14.1
10	14.2	14.3	14.5	14.6	14.8	14.9	15.1	15.2	15.3	15.5
11	15.6	15.8	15.9	16.1	16.2	16.3	16.5	16.6	16.8	16.9
12	17.0	17.2	17.3	17.5	17.6	17.8	17.9	18.0	18.2	18.3
13	18.5	18.6	18.8	18.9	19.0	19.2	19.3	19.5	19.6	19.7
14	19.9	20.0	20.2	20.3	20.5	20.6	20.7	20.9	21.0	21.2
15	21.3	21.4	21.6	21.7	21.9	22.0	22.2	22.3	22.4	22.6
16	22.7	22.9	23.0	23.2	23.3	23.4	23.6	23.7	23.9	24.0
17	24.1	24.3	24.4	24.6	24.7	24.9	25.0	25.1	25.3	25.4
18	25.6	25.7	25.9	26.0	26.1	26.3	26.4	26.6	26.7	26.8
19	27.0	27.1	27.3	27.4	27.6	27.7	27.8	28.0	28.1	28.3
20	28.4	28.5	28.7	28.8	29.0	29.1	29.3	29.4	29.5	29.7
21	29.8	30.0	30.1	30.3	30.4	30.5	30.7	30.8	31.0	31.1
22	31.2	31.4	31.5	31.7	31.8	32.0	32.1	32.2	32.4	32.5
23	32.7	32.8	33.0	33.1	33.2	33.4	33.5	33.7	33.8	33.9
24	34.1	34.2	34.4	34.5	34.7	34.8	34.9	35.1	35.2	35.4
25	35.5	35.6	35.8	35.9	36.1	36.2	36.4	36.5	36.6	36.8
26	36.9	37.1	37.2	37.4	37.5	37.6	37.8	37.9	38.1	38.2
27	38.3	38.5	38.6	38.8	38.9	39.1	39.2	39.3	39.5	39.6
28	39.8	39.9	40.1	40.2	40.3	40.5	40.6	40.8	40.9	41.0
29	41.2	41.3	41.5	41.6	41.8	41.9	42.0	42.2	42.3	42.5
30	42.6	42.7	42.9	43.0	43.2	43.3	43.5	43.6	43.7	43.9
31	44.0	44.2	44.3	45.9	44.6	44.7	44.9	45.0	45.2	45.3
32	45.4	45.6	45.7	47.3	46.0	46.2	46.3	46.4	46.6	46.7
33	46.9	47.0	47.2	48.7	47.4	47.6	47.7	47.9	48.0	48.1
34	48.3	48.4	48.6	50.2	48.9	49.0	49.1	49.3	49.4	49.6
35	49.7	49.9	50.0	51.6	50.3	50.4	50.6	50.7	50.8	51.0
36	51.1	51.3	51.4	53.0	51.7	51.8	52.0	52.1	52.3	52.4
37	52.5	52.7	52.8	54.4	53.1	53.3	53.4	53.5	53.7	53.8
38	54.0	54.1	54.3	55.8	54.5	54.7	54.8	55.0	55.1	55.2
39	55.4	55.5	55.8	57.3	56.0	56.1	56.2	56.4	56.5	56.7
40	56.8	57.0	57.2	58.7	57.4	57.5	57.7	57.8	57.9	58.1

!!!!!MULTIPLE FACTOR PRISM TABLE!!!!!

	BAF				BAF				BAF		
	10	37.5	40		10	37.5	40		10	37.5	40
	Limiting Distance Factor				*Limiting Distance Factor*				*Limiting Distance Factor*		
	2.750	*1.420*	*1.375*		*2.750*	*1.420*	*1.375*		*2.750*	*1.420*	*1.375*
Diameter	**Distance in Feet**			**Diameter**	**Distance in Feet**			**Diameter**	**Distance in Feet**		
5.0	13.8	7.1	6.9	9.1	25.0	12.9	12.5	14.1	38.8	20.0	19.4
5.1	14.0	7.2	7.0	9.2	25.3	13.1	12.7	14.2	39.0	20.2	19.5
5.2	14.3	7.4	7.2	9.3	25.6	13.2	12.8	14.3	39.3	20.3	19.7
5.3	14.6	7.5	7.3	9.4	25.9	13.3	12.9	14.4	39.6	20.4	19.8
5.4	14.9	7.7	7.4	9.5	26.1	13.5	13.1	14.5	39.9	20.6	19.9
5.5	15.1	7.8	7.6	9.6	26.4	13.6	13.2	14.6	40.1	20.7	20.1
5.6	15.4	8.0	7.7	9.7	26.7	13.8	13.3	14.7	40.4	20.9	20.2
5.7	15.7	8.1	7.8	9.8	27.0	13.9	13.5	14.8	40.7	21.0	20.4
5.8	16.0	8.2	8.0	9.9	27.2	14.1	13.6	14.9	41.0	21.2	20.5
5.9	16.2	8.4	8.1	10.0	27.5	14.2	13.8	15.0	41.2	21.3	20.6
6.0	16.5	8.5	8.2	10.1	27.8	14.3	13.9	15.1	41.5	21.4	20.8
6.1	16.8	8.7	8.4	10.2	28.0	14.5	14.0	15.2	41.8	21.6	20.9
6.2	17.1	8.8	8.5	10.3	28.3	14.6	14.2	15.3	42.1	21.7	21.0
6.3	17.3	8.9	8.7	10.4	28.6	14.8	14.3	15.4	42.3	21.9	21.2
6.4	17.6	9.1	8.8	10.5	28.9	14.9	14.4	15.5	42.6	22.0	21.3
6.5	17.9	9.2	8.9	10.6	29.1	15.1	14.6	15.6	42.9	22.2	21.4
6.6	18.2	9.4	9.1	10.7	29.4	15.2	14.7	15.7	43.2	22.3	21.6
6.7	18.4	9.5	9.2	10.8	29.7	15.3	14.9	15.8	43.4	22.4	21.7
6.8	18.7	9.7	9.3	10.9	30.0	15.5	15.0	15.9	43.7	22.6	21.9
6.9	19.0	9.8	9.5	11.0	30.2	15.6	15.1	16.0	44.0	22.7	22.0
7.0	19.3	9.9	9.6	11.1	30.5	15.8	15.3	16.1	44.3	22.9	22.1
7.1	19.5	10.1	9.8	11.2	30.8	15.9	15.4	16.2	44.5	23.0	22.3
7.2	19.8	10.2	9.9	11.3	31.1	16.0	15.5	16.3	44.8	23.1	22.4
7.3	20.1	10.4	10.0	11.4	31.3	16.2	15.7	16.4	45.1	23.3	22.6
7.4	20.4	10.5	10.2	11.5	31.6	16.3	15.8	16.5	45.4	23.4	22.7
7.5	20.6	10.7	10.3	11.6	31.9	16.5	16.0	16.6	45.6	23.6	22.8
7.6	20.9	10.8	10.5	11.7	32.2	16.6	16.1	16.7	45.9	23.7	23.0
7.7	21.2	10.9	10.6	11.8	32.4	16.8	16.2	16.8	46.2	23.9	23.1
7.8	21.5	11.1	10.7	11.9	32.7	16.9	16.4	16.9	46.5	24.0	23.2
7.9	21.7	11.2	10.9	12.0	33.0	17.0	16.5	17.0	46.7	24.1	23.4
8.0	22.0	11.4	11.0	12.1	33.3	17.2	16.6	17.1	47.0	24.3	23.5
8.1	22.3	11.5	11.1	12.2	33.5	17.3	16.8	17.2	47.3	24.4	23.7
8.2	22.6	11.6	11.3	12.3	33.8	17.5	16.9	17.3	47.6	24.6	23.8
8.3	22.8	11.8	11.4	12.4	34.1	17.6	17.1	17.4	47.8	24.7	23.9
8.4	23.1	11.9	11.6	12.5	34.4	17.8	17.2	17.5	48.1	24.9	24.1
8.5	23.4	12.1	11.7	12.6	34.6	17.9	17.3	17.6	48.4	25.0	24.2
8.6	23.7	12.2	11.8	12.7	34.9	18.0	17.5	17.7	48.7	25.1	24.3
8.7	23.9	12.4	12.0	12.8	35.2	18.2	17.6	17.8	49.0	25.3	24.5
8.8	24.2	12.5	12.1	12.9	35.5	18.3	17.7	17.9	49.2	25.4	24.6
8.9	24.5	12.6	12.2	13.0	35.7	18.5	17.9	18.0	49.5	25.6	24.8
9.0	24.8	12.8	12.4	13.1	36.0	18.6	18.0	18.1	49.8	25.7	24.9
9.1	25.0	12.9	12.5	13.2	36.3	18.7	18.2	18.2	50.1	25.8	25.0
9.2	25.3	13.1	12.7	13.3	36.6	18.9	18.3	18.3	50.3	26.0	25.2
9.3	25.6	13.2	12.8	13.4	36.8	19.0	18.4	18.4	50.6	26.1	25.3
9.4	25.9	13.3	12.9	13.5	37.1	19.2	18.6	18.5	50.9	26.3	25.4
9.5	26.1	13.5	13.1	13.6	37.4	19.3	18.7	18.6	51.2	26.4	25.6
9.6	26.4	13.6	13.2	13.7	37.7	19.5	18.8	18.7	51.4	26.6	25.7
9.7	26.7	13.8	13.3	13.8	37.9	19.6	19.0	18.8	51.7	26.7	25.9
9.8	27.0	13.9	13.5	13.9	38.2	19.7	19.1	18.9	52.0	26.8	26.0
9.9	27.2	14.1	13.6	14.0	38.5	19.9	19.3	19.0	52.3	27.0	26.1

!!!!!!CONTINUATION OF MULTIPLE FACTOR PRISM TABLE!!!!!!

	BAF				BAF		
	10	37.5	40		10	37.5	40
	Limiting Distance Factor				*Limiting Distance Factor*		
	2.750	*1.420*	*1.375*		*2.750*	*1.420*	*1.375*
Diameter	**Distance in Feet**			**Diameter**	**Distance in Feet**		
19.1	52.5	27.1	26.3	24.1	66.3	34.2	33.1
19.2	52.8	27.3	26.4	24.2	66.6	34.4	33.3
19.3	53.1	27.4	26.5	24.3	66.8	34.5	33.4
19.4	53.4	27.5	26.7	24.4	67.1	34.7	33.6
19.5	53.6	27.7	26.8	24.5	67.4	34.8	33.7
19.6	53.9	27.8	27.0	24.6	67.7	34.9	33.8
19.7	54.2	28.0	27.1	24.7	67.9	35.1	34.0
19.8	54.5	28.1	27.2	24.8	68.2	35.2	34.1
19.9	54.7	28.3	27.4	24.9	68.5	35.4	34.2
20.0	55.0	28.4	27.5	25.0	68.8	35.5	34.4
20.1	55.3	28.5	27.6	25.1	69.0	35.6	34.5
20.2	55.6	28.7	27.8	25.2	69.3	35.8	34.7
20.3	55.8	28.8	27.9	25.3	69.6	35.9	34.8
20.4	56.1	29.0	28.1	25.4	69.9	36.1	34.9
20.5	56.4	29.1	28.2	25.5	70.1	36.2	35.1
20.6	56.7	29.3	28.3	25.6	70.4	36.4	35.2
20.7	56.9	29.4	28.5	25.7	70.7	36.5	35.3
20.8	57.2	29.5	28.6	25.8	71.0	36.6	35.5
20.9	57.5	29.7	28.7	25.9	71.2	36.8	35.6
21.0	57.8	29.8	28.9	26.0	71.5	36.9	35.8
21.1	58.0	30.0	29.0	26.1	71.8	37.1	35.9
21.2	58.3	30.1	29.2	26.2	72.1	37.2	36.0
21.3	58.6	30.2	29.3	26.3	72.3	37.3	36.2
21.4	58.9	30.4	29.4	26.4	72.6	37.5	36.3
21.5	59.1	30.5	29.6	26.5	72.9	37.6	36.4
21.6	59.4	30.7	29.7	26.6	73.2	37.8	36.6
21.7	59.7	30.8	29.8	26.7	73.4	37.9	36.7
21.8	60.0	31.0	30.0	26.8	73.7	38.1	36.9
21.9	60.2	31.1	30.1	26.9	74.0	38.2	37.0
22.0	60.5	31.2	30.3	27.0	74.3	38.3	37.1
22.1	60.8	31.4	30.4	27.1	74.5	38.5	37.3
22.2	61.1	31.5	30.5	27.2	74.8	38.6	37.4
22.3	61.3	31.7	30.7	27.3	75.1	38.8	37.5
22.4	61.6	31.8	30.8	27.4	75.4	38.9	37.7
22.5	61.9	32.0	30.9	27.5	75.6	39.1	37.8
22.6	62.2	32.1	31.1	27.6	75.9	39.2	38.0
22.7	62.4	32.2	31.2	27.7	76.2	39.3	38.1
22.8	62.7	32.4	31.4	27.8	76.5	39.5	38.2
22.9	63.0	32.5	31.5	27.9	76.7	39.6	38.4
23.0	63.3	32.7	31.6	28.0	77.0	39.8	38.5
23.1	63.5	32.8	31.8	28.1	77.3	39.9	38.6
23.2	63.8	32.9	31.9	28.2	77.6	40.0	38.8
23.3	64.1	33.1	32.0	28.3	77.8	40.2	38.9
23.4	64.4	33.2	32.2	28.4	78.1	40.3	39.1
23.5	64.6	33.4	32.3	28.5	78.4	40.5	39.2
23.6	64.9	33.5	32.5	28.6	78.7	40.6	39.3
23.7	65.2	33.7	32.6	28.7	78.9	40.8	39.5
23.8	65.5	33.8	32.7	28.8	79.2	40.9	39.6
23.9	65.7	33.9	32.9	28.9	79.5	41.0	39.7
24.0	66.0	34.1	33.0	29.0	79.8	41.2	39.9



Offset or "borderline" view when a prism is used to determine diameter.

This illustration is a depiction of the bole when viewed through a prism. The horizontal dashed line represents the LENGTH TO DIAMETER MEASUREMENT POINT. When the offset or borderline is achieved represented by the vertical dashed line and a wedge prism is used, the horizontal distance from the tree is found in the table to determine the corresponding diameter from the table. If a pentaprism is used, read the diameter directly from the diameter scale on the pentaprism.

If the horizontal distance or prism factor is not represented on the preceding tables, take the horizontal distance and divide it by the limiting distance factor for the prism being used to determine the diameter.

Prism	Limiting Distance Factor
10	2.750
30	1.588
37.5	1.420
40	1.375

Example using a 37.5 factor prism: 58.1 feet / 1.420 = 40.9-in diameter.

SLOPE CORRECTION FOR SELECTED HORIZONTAL DISTANCES (Corrections given in both horizontal distance and slope distance)										
% Slope	Horizontal Distance					Horizontal Distance				
	50	60	66	70	100	50	60	66	70	100
	Feet to add in **horizontal** distance					Feet to add in **slope** distance				
5	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
10	0.2	0.3	0.3	0.4	0.5	0.2	0.3	0.3	0.4	0.5
15	0.6	0.7	0.7	0.8	1.1	0.6	0.7	0.7	0.8	1.1
20	1.0	1.2	1.3	1.4	2.0	1.0	1.2	1.3	1.4	2.0
25	1.5	1.8	2.0	2.1	3.0	1.5	1.9	2.0	2.2	3.1
30	2.1	2.5	2.8	2.9	4.2	2.2	2.6	2.9	3.0	4.4
35	2.8	3.4	3.7	3.9	5.6	3.0	3.6	3.9	4.1	5.9
40	3.6	4.3	4.7	5.0	7.2	3.9	4.6	5.1	5.4	7.7
45	4.4	5.3	5.8	6.2	8.8	4.8	5.8	6.4	6.8	9.6
50	5.3	6.3	7.0	7.4	10.6	5.9	7.0	7.8	8.3	11.8
55	6.2	7.4	8.2	8.7	12.4	7.0	8.4	9.3	9.9	14.1
60	7.1	8.6	9.4	9.9	14.2	8.3	10.0	11.0	11.5	16.6
65	8.1	9.7	10.7	11.3	16.2	9.6	11.6	12.7	13.5	19.3
70	9.0	10.8	11.9	12.7	18.1	11.0	13.2	14.6	15.5	22.1
75	10.0	12.0	13.2	14.0	20.0	12.5	15.0	16.5	17.5	25.0
80	11.0	13.1	14.5	15.3	21.9	14.0	16.8	18.5	19.6	28.1
85	11.9	14.3	15.7	16.7	23.8	15.6	18.8	20.6	21.9	31.2
90	12.8	15.4	16.9	17.9	25.6	17.3	20.7	22.8	24.1	34.5
100	14.6	17.6	19.3	20.5	29.3	20.7	24.9	27.3	29.0	41.4
105	15.5	18.6	20.5	21.7	31.0	22.5	27.0	29.7	31.5	45.0
110	16.4	19.6	21.6	23.0	32.8	24.3	29.1	32.1	34.2	48.7
115	17.2	20.6	22.7	24.1	34.4	26.2	31.4	34.6	36.7	52.4
120	18.0	21.6	23.7	25.2	36.0	28.1	33.7	37.1	39.4	56.2