FOREST INVENTORY AND ANALYSIS
NATIONAL CORE FIELD GUIDE

VOLUME I: FIELD DATA COLLECTION PROCEDURES FOR PHASE 2 PLOTS

Version 5.1

Changes from the Phase 2 Field Guide version 5.0 to version 5.1

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.

- Section 8. Phase 2 (P2) Vegetation Profile (Core Optional). Corrected several figure numbers and figure references in the text.

- **8.2. General definitions. NRCS PLANTS database. Changed text from:**
  "USDA, NRCS. 2000. The PLANTS Database (http://plants.usda.gov, 1 January 2000). National Plant Data Center, Baton Rouge, LA 70874-4490 USA.

  FIA currently uses a stable codeset downloaded in January of 2000."

  To:
  "USDA, NRCS. 2010. The PLANTS Database (http://plants.usda.gov, 1 January 2010). National Plant Data Center, Baton Rouge, LA 70874-4490 USA.
  FIA currently uses a stable codeset downloaded in January of 2010".

- **8.6.2. SPECIES CODE. Changed the text in the first paragraph from:**
  "Record a code for each sampled vascular plant species found rooted in or overhanging the sampled condition of the subplot at any height. Species codes must be the standardized codes in the Natural Resource Conservation Service (NRCS) PLANTS database (currently January 2000 version). Identification to species only is expected. However, if subspecies information is known, enter the appropriate NRCS code. For graminoids, genus and unknown codes are acceptable, but do not lump species of the same genera or unknown code. For example, if several unknown CAREX species are present, only record the individual species present with cover of at least 3 percent."

  To:
  "Record a code for each sampled vascular plant species found rooted in or overhanging the sampled condition of the subplot at any height. Species codes must be the standardized codes in the Natural Resource Conservation Service (NRCS) PLANTS database (currently January 2010 version). Identification to species only is expected. However, if subspecies information is known, enter the appropriate NRCS code. For graminoids, genus and unknown codes are acceptable, but do not lump species of the same genera or unknown code. For example, if several unknown CAREX species are present, only record the individual species present with cover of at least 3 percent."

- **9.9. SPECIES CODE. Changed the text in the first paragraph from:**
  "Record the code for any species listed in appendix 9 that is found rooted in or overhanging (and rooted out of) the measured condition within the subplot. Species codes must be the standardized codes in the Natural Resource Conservation Service (NRCS) PLANTS database January 2000 version maintained by the FIA IM group (USDA, NRCS. 2000. The PLANTS database [http://plants.usda.gov/plants]. National Plant Data Center, Baton Rouge, LA 70874-4490)."

  To:
  "Record the code for any species listed in appendix 9 that is found rooted in or overhanging (and rooted out of) the measured condition within the subplot. Species codes must be the standardized codes in the Natural Resource Conservation Service (NRCS) PLANTS database January 2010 version maintained by the FIA IM group (USDA, NRCS. 2010. The PLANTS database [http://plants.usda.gov/plants]. National Plant Data Center, Baton Rouge, LA 70874-4490)."

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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)
5.0 July 2009 (revised from change management process, change proposals approved by FIA Management Team, from Charleston, SC, Data Acquisition Band Meeting, Mar. 2009, and from multiple Data Acquisition Band conference calls)
October 2010 (revised from change management process and from Portland, OR, Data Acquisition Band Meeting, Feb. 2010 and subsequent conference calls)
5.1 October 2011 (revised from change management process)

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.

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
8 Phase 2 Vegetation Profile (core optional)
9 Invasive Plants

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

DATA ELEMENT NAME -- <brief variable description>

When collected: <when data element is recorded>
Field width: <X digits>
Tolerance: <range of measurement that is acceptable>
MQO: <measurement quality objective>
Values: <legal values for coded variables>

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

Tolerances may be stated in +/- terms or number of classes for ordered categorical data elements (e.g., +/- 2 classes); in absolute terms for some continuous variables (e.g., +/- 0.2

inches); or in terms of percent of the value of the data element (e.g., +/- 10 percent of the value). For some data elements, no errors are tolerated (e.g., PLOT NUMBER).

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

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

Units Of Measure

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

Plot Dimensions:

Macroplot:

Radius = 58.9 feet
Area = 10,899 square feet or 0.25 acre (ac) or 1/4 acre

Subplot:

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

Microplot:

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

Annular plot:

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

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

Tree Limiting Dimensions:

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

0.0 General Description

The CORE field plot consists of four subplots approximately 1/24 acre in size with a radius of 24.0 feet. The center subplot is subplot 1. Subplots 2, 3, and 4 are located 120.0 feet horizontal (+/- 7 feet) at azimuths of 360, 120, and 240 degrees from the center of subplot 1, respectively (see fig. 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.

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]).

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

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

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

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

Data are collected on field plots at the following levels:

Plot	Data that describe the entire cluster of four subplots.
Subplot	Data that describe a single subplot of a cluster.
Condition Class	A discrete combination of landscape attributes that describe the environment on all or part of the plot. These attributes include CONDITION CLASS STATUS, RESERVED STATUS, OWNER GROUP, FOREST TYPE, STAND SIZE CLASS, REGENERATION STATUS, and TREE DENSITY.

Boundary	An approximate description of the demarcation line between two condition classes that occur on a single subplot, microplot, or macroplot. There is no boundary recorded when the demarcation occurs beyond the fixed-radius plots.
Tree	Data describing saplings with a diameter 1.0 inch through 4.9 inches, and trees with diameter greater than or equal to 5.0 inches
Seedling	Data describing trees with a diameter less than 1.0 inch and greater than or equal to 0.5 foot in length (conifers) or greater than or equal to 1.0 foot in length (hardwoods).
Site Tree	Data describing site index trees.

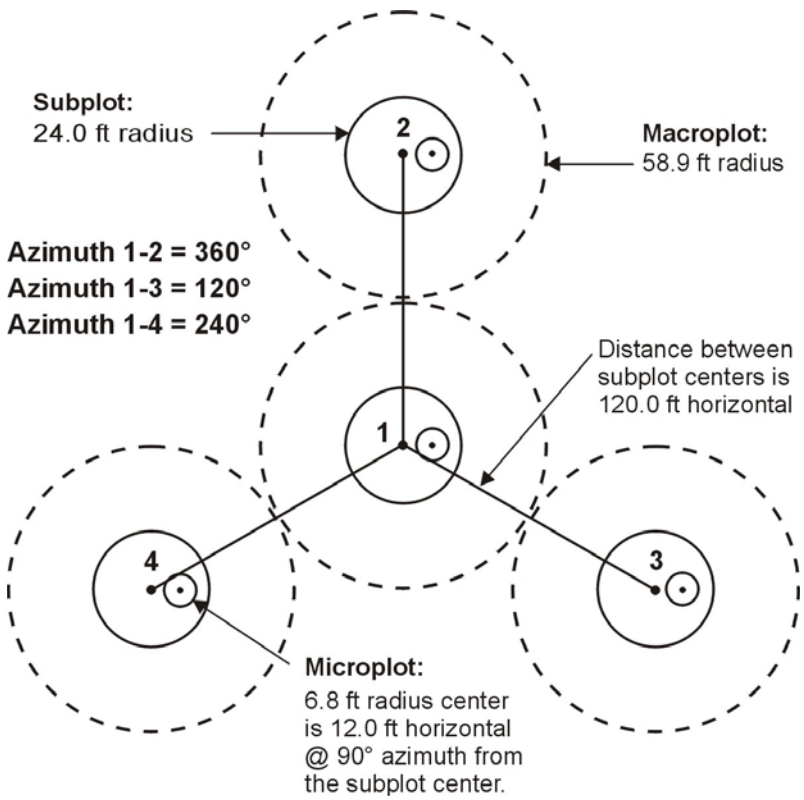


Figure 1. FIA Phase 2 plot diagram. See individual Phase 3 chapters for Phase 3 plot figures.

0.1 Plot Setup

Plots will be established according to the regional guidelines of each FIA unit. 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.

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

Subplot From	Numbers To	Azimuth	Backsight	Distance
		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.

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.

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. A clearcut plot is considered to be forest land until it is actively converted to another land use. Additional information concerning land use classifications is contained in Section 2.3.

1.1 STATE

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

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

1.2 COUNTY

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

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

1.3 PLOT NUMBER

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

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

1.4 PLOT STATUS

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

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

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

1.5 NONFOREST SAMPLING STATUS

Record whether this plot is part of a nonforest inventory. If NONFOREST SAMPLING STATUS = 1, then the entire suite of attributes that are measured on the forest lands will be measured and only those suites of attributes that are measured on forest lands can be measured on nonforest lands.

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

0	Nonforest plots / conditions are not inventoried
1	Nonforest plots / conditions are inventoried

1.6 NONFOREST PLOT STATUS

Record the code that describes the sampling status of the other-than-forest plot, i.e., PLOT STATUS = 2. In cases where the plot is inaccessible, but obviously contains no nonforest land, i.e., plot is either noncensus water or census water, record NONFOREST PLOT STATUS = 2.

When collected: When PLOT STATUS = 2 and NONFOREST SAMPLING STATUS = 0 or 1
Field width: 1 digit
Tolerance: no errors
MQO: At least 99% of the time
Values:

1	Sampled – at least one accessible nonforest land condition present on the plot
2	Sampled – no nonforest land condition present on plot, i.e., plot is either census and/or noncensus water
3	Nonsampled nonforest

1.7 PLOT NONSAMPLED REASON

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

When collected: When PLOT STATUS = 3
Field width: 2 digits
Tolerance: No errors
MQO: At least 99% of the time
Values:

01 Outside U.S. boundary – Entire plot is outside of the U.S. border.

02 Denied access – Access to the entire plot is denied by the legal owner, or by the owner of the only reasonable route to the plot. Because a denied-access plot can become accessible in the future, it remains in the sample and is re-examined at the next occasion to determine if access is available.

03 Hazardous – Entire plot cannot be accessed because of a hazard or danger, for example cliffs, quarries, strip mines, illegal substance plantations, high water, etc. Although most hazards will not change over time, a hazardous plot remains in the sample and is re-examined at the next occasion to determine if the hazard is still present.

05 Lost data – Plot data file was discovered to be corrupt after a panel was completed and submitted for processing. This code is applied at the time of processing after notification to the units. This code is for office use only.

06 Lost plot – Entire plot cannot be found. Whenever this code is assigned, a replacement plot is required. The plot that is lost is assigned SAMPLE KIND = 2 and NONSAMPLED REASON = 6. The replacement plot is assigned SAMPLE KIND = 3.

07 Wrong location – Previous plot can be found, but its placement is beyond the tolerance limits for plot location. Whenever this code is assigned, a replacement plot is required. The plot being relocated is assigned SAMPLE KIND = 2 and NONSAMPLED REASON = 7. Its replacement plot is assigned SAMPLE KIND = 3.

08 Skipped visit – Entire plot skipped. Used for plots that are not completed prior to the time a panel is finished and submitted for processing. This code is for office use only.

09 Dropped intensified plot - Intensified plot dropped due to a change in grid density. This code used only by units engaged in intensification. This code is for office use only.

10 Other – Entire plot not sampled due to a reason other than one of the specific reasons already listed. A field note is required to describe the situation.

11 Ocean – Plot falls in ocean water below mean high tide line.

1.8 NONFOREST PLOT NONSAMPLED REASON

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

When collected: When PLOT STATUS = 2 and NONFOREST SAMPLING STATUS = 1 and NONFOREST PLOT STATUS = 3
Field width: 2 digits
Tolerance: No errors
MQO: At least 99% of the time
Values:

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.

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.

1.9 SUBPLOTS EXAMINED

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

When collected: When PLOT STATUS = 2 or 3
Field width: 1 digit
Tolerance: No errors
MQO: At least 90% of the time
Values:

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

1.10 SAMPLE KIND

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

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

Values:

1 Initial plot establishment - the initial establishment and sampling of a national design plot (FIA Field Guide versions 1.1 and higher). SAMPLE KIND 1 is assigned under the following circumstances:
- Initial activation of a panel or subpanel
- Reactivation of a panel or subpanel that was previously dropped
- Resampling of established plots that were not sampled at the previous visit

2 Remeasurement – remeasurement of a national design plot that was sampled at the previous inventory.

3 Replacement plot - a replacement plot for a previously established plot. Assign SAMPLE KIND = 3 if a plot is re-installed at a location other than the original location (i.e., plots that have been lost, moved, or otherwise replaced). Note that replacement plots require a separate plot file for the replaced plot. Replaced plots are assigned SAMPLE KIND = 2, PLOT STATUS = 3, and the appropriate NONSAMPLED REASON code. The plot number for the new (replacement) plot is assigned by NIMS.

1.11 PREVIOUS PLOT NUMBER

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

When collected: When SAMPLE KIND = 3
Field width: 5 digits
Tolerance: No errors
MQO: At least 99% of the time
Values: 00001 to 99999

1.12 FIELD GUIDE VERSION

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

When collected: All plots
Field width: 2 digits (x.y)
Tolerance: No errors
MQO: At least 99% of the time
Values: 5.0

1.13 CURRENT DATE

Record the year, month, and day that the current plot visit was completed as described in 1.13.1 – 1.13.3.

1.13.1 YEAR

Record the year that the plot was completed.

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

1.13.2 MONTH

Record the month that the plot was completed.

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

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

1.13.3 DAY

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

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

1.14 DECLINATION (CORE OPTIONAL)

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

DECLINATION = (TRUE NORTH - MAGNETIC NORTH)

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

1.15 HORIZONTAL DISTANCE TO IMPROVED ROAD

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

When collected: All plots with either one accessible forest land condition class (PLOT STATUS = 1) or one accessible nonforest land condition class when nonforest is being sampled (PLOT STATUS = 2 and NONFOREST SAMPLING STATUS = 1 and NONFOREST 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

1.16 WATER ON PLOT

Record the water source that has the greatest impact on the area within the accessible forest/nonforest land portion of any of the four subplots. The coding hierarchy is listed in order from large permanent water to temporary water. This variable can be used for recreation, wildlife, hydrology, and timber availability studies.

When collected: All plots with either at least one accessible forest land condition class (PLOT STATUS = 1) or one accessible nonforest land condition class when nonforest is being sampled (PLOT STATUS = 2 and NONFOREST SAMPLING STATUS = 1 and NONFOREST 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/nonforest land CONDITION CLASS
1 Permanent streams or ponds too small to qualify as noncensus water
2 Permanent water in the form of deep swamps, bogs, marshes without standing trees present and less than 1.0 ac in size, or with standing trees
3 Ditch/canal – human-made channels used as a means of moving water, such as irrigation or drainage which are too small to qualify as noncensus water
4 Temporary streams
5 Flood zones – evidence of flooding when bodies of water exceed their natural banks
9 Other temporary water – specify in plot notes

1.17 QA STATUS

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

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

1 Standard production plot
2 Cold check
3 Reference plot (off grid)
4 Training/practice plot (off grid)
5 Botched plot file (disregard during data processing)
6 Blind check
7 Hot check (production plot)

1.18 CREW NUMBER

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

When collected: All plots
Field Width: 6 digits
Tolerance: No errors
MQO: At least 99% of the time
Values:

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

1.19 GPS Coordinates

Use a global positioning system (GPS) unit to determine the plot coordinates and elevation of all field-visited plot locations even if GPS has been used to locate the plot in the past.

1.19.1 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 use the NAD83 Datum to collect coordinates.

Each FIA unit will 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.

1.19.2 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. Record the azimuth and horizontal distance as described in Sections 1.19.14 and 1.19.15.

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. Record the azimuth and horizontal distance as described in Sections 1.19.14 and 1.19.15.

In all cases try to obtain at least 180 positions before recording the coordinates. Coordinates not collected by automatic means shall be manually double-entered into the data recorder.

1.19.3 GPS UNIT

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

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

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

1.19.4 GPS SERIAL NUMBER

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

When collected: When GPS UNIT > 0
Field width: 6 digits
Tolerance: No errors
MQO: At least 99% of the time
Values: 000001 to 999999

1.19.5 GPS ENTRY METHOD

Identify the method used to record GPS data. If GPS data are manually entered, record 0. If GPS data are transferred electronically from the GPS receiver to the data recorder, record 1.

Upon entering a 1 the following variables are automatically populated in accordance with the GPS receiver setup in 1.19.1 (coordinates LATITUDE, LONGITUDE or UTM, GPS ELEVATION, GPS ERROR, and NUMBER OF READINGS). All other GPS variables must be populated via manual key-entry.

When Collected: GPS UNIT > 0
Field width: 1 digit
Tolerance: No errors
MQO: at least 99% of the time
Values:

0	GPS data manually entered
1	GPS data electronically transferred

1.19.6 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:

NAD83	North American Datum of 1983

1.19.7 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

1.19.8 Latitude

Record the latitude of the plot center to the nearest hundredth second, as determined by GPS.

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.

1.19.8.1 LATITUDE DEGREES

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

When collected: When COORDINATE SYSTEM = 1
Field width: 3 digits (1st digit is + or -, last 2 digits are numeric)
Tolerance: When GPS ENTRY METHOD = 0, No errors in data entry
When GPS ENTRY METHOD = 1, not applicable
MQO: When GPS ENTRY METHOD = 0, at least 99% of the time
When GPS ENTRY METHOD = 1, not applicable
Values: 0-90

1.19.8.2 LATITUDE MINUTES

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

When collected: When COORDINATE SYSTEM = 1
Field width: 2 digits
Tolerance: When GPS ENTRY METHOD = 0, No errors in data entry
When GPS ENTRY METHOD = 1, not applicable
MQO: When GPS ENTRY METHOD = 0, at least 99% of the time
When GPS ENTRY METHOD = 1, not applicable
Values: 1 – 59

1.19.8.3 LATITUDE SECONDS

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

When collected: When COORDINATE SYSTEM = 1
Field width: 4 digits
Tolerance: When GPS ENTRY METHOD = 0, No errors in data entry
When GPS ENTRY METHOD = 1, not applicable
MQO: When GPS ENTRY METHOD = 0, at least 99% of the time
When GPS ENTRY METHOD = 1, not applicable
Values: 0.00 - 59.99

1.19.9 Longitude

Record the longitude of the plot center, to the nearest hundredth second, as determined by GPS.

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.

1.19.9.1 LONGITUDE DEGREES

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

When collected: When COORDINATE SYSTEM = 1
Field width: 4 digits (1st digit is + or -, last 3 digits are numeric)
Tolerance: When GPS ENTRY METHOD = 0, No errors in data entry
When GPS ENTRY METHOD = 1, not applicable
MQO: When GPS ENTRY METHOD = 0, at least 99% of the time
When GPS ENTRY METHOD = 1, not applicable
Values: 1-180

1.19.9.2 LONGITUDE MINUTES

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

When collected: When COORDINATE SYSTEM = 1
Field width: 2 digits
Tolerance: When GPS ENTRY METHOD = 0, No errors in data entry
When GPS ENTRY METHOD = 1, not applicable
MQO: When GPS ENTRY METHOD = 0, at least 99% of the time
When GPS ENTRY METHOD = 1, not applicable
Values: 1 – 59

1.19.9.3 LONGITUDE SECONDS

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

When collected: When COORDINATE SYSTEM = 1
Field width: 4 digits
Tolerance: When GPS ENTRY METHOD = 0, No errors in data entry
When GPS ENTRY METHOD = 1, not applicable
MQO: When GPS ENTRY METHOD = 0, at least 99% of the time
When GPS ENTRY METHOD = 1, not applicable
Values: 0.00 – 59.99

1.19.10 UTM ZONE

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

When collected: When COORDINATE SYSTEM = 2
Field width: 3 digits: (##C)
Tolerance: When GPS ENTRY METHOD = 0, No errors in data entry
When GPS ENTRY METHOD = 1, not applicable
MQO: When GPS ENTRY METHOD = 0, at least 99% of the time
When GPS ENTRY METHOD = 1, not applicable
Values: Number varies from 2 in Alaska to 19 on the East Coast. The letter varies from Q in Hawaii to W in Alaska.

1.19.11 EASTING (X) UTM

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

When collected: When COORDINATE SYSTEM = 2
Field width: 7 digits
Tolerance: When GPS ENTRY METHOD = 0, No errors in data entry
When GPS ENTRY METHOD = 1, not applicable
MQO: When GPS ENTRY METHOD = 0, at least 99% of the time
When GPS ENTRY METHOD = 1, not applicable
Values: 0000000 - 9999999

1.19.12 NORTHING (Y) UTM

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

When collected: When COORDINATE SYSTEM = 2
Field width: 7 digits
Tolerance: When GPS ENTRY METHOD = 0, No errors in data entry
When GPS ENTRY METHOD = 1, not applicable
MQO: When GPS ENTRY METHOD = 0, at least 99% of the time
When GPS ENTRY METHOD = 1, not applicable
Values: 0000000 - 9999999

1.19.13 Correction For "Offset" Location

As described in Section 1.19.2, coordinates may be collected at a location other than the plot center (an "offset" location). If the GPS unit is capable of calculating plot center coordinates then AZIMUTH TO PLOT CENTER and DISTANCE TO PLOT CENTER both equal 000.

1.19.14 AZIMUTH TO PLOT CENTER

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

When collected: When GPS UNIT = 1, 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

1.19.15 DISTANCE TO PLOT CENTER

Record the horizontal distance in feet from the location where coordinates were collected to the actual plot center. If coordinates are collected at plot center or are corrected in the field to plot center, record 000. As described in Section 1.19.2, 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 = 1, 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

1.19.16 GPS ELEVATION

Record the elevation above mean sea level of the plot center, in feet, as determined by GPS.

When collected: When GPS UNIT = 1, 2 or 4
Field width: 6 digits (1st digit is + or -, last 5 digits are numeric)
Tolerance: No errors
MQO: At least 99% of the time
Values: -00100 to +20000

1.19.17 GPS ERROR

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

When collected: When GPS UNIT =1 or 2
Field width: 3 digits
Tolerance: No errors
MQO: At least 99% of the time
Values: 000 - 999
071 to 999 if an error of less than 70 cannot be obtained

1.19.18 NUMBER OF READINGS

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

When collected: When GPS UNIT = 1 or 2
Field width: 3 digits
Tolerance: No errors
MQO: At least 99% of the time
Values: 001 to 999

1.19.19 GPS FILENAME (CORE OPTIONAL)

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

When collected: When GPS UNIT = 3
Field width: 15 characters
Tolerance: No errors
MQO: At least 99% of the time
Values: English words, phrases and numbers

1.20 MACROPLOT BREAKPOINT DIAMETER (CORE OPTIONAL)

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

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

1.21 PLOT NOTES

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

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

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 – possibility of forest land

Accessible forest land defines the population of interest for FIA purposes. This is the area where most of the data collection is conducted.

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

(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.

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 (fig. 2).

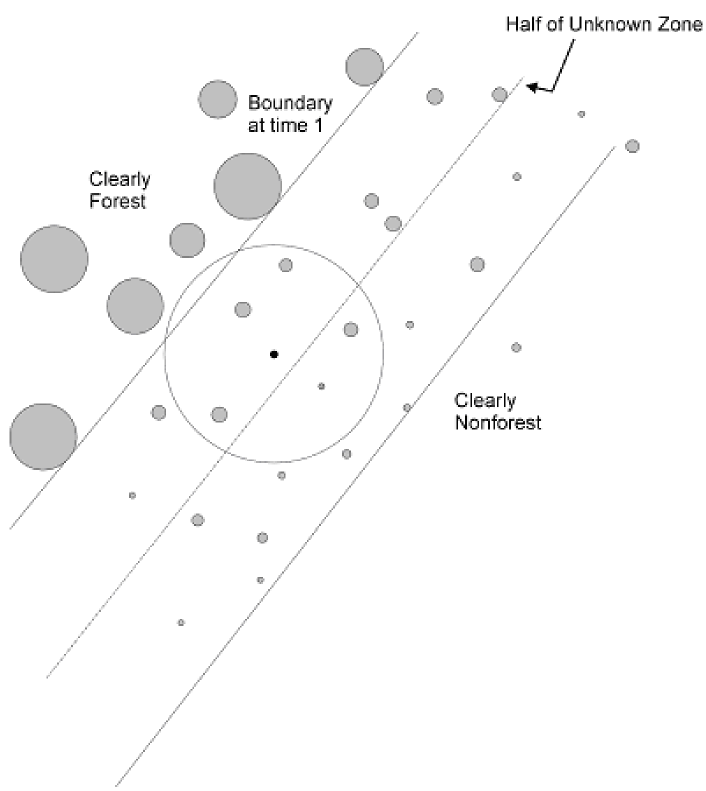


Figure 2. Example of classifying the condition class of the subplot in a transition zone with forest/nonforest encroachment.

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.

<u>Treated strips</u> – 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.

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

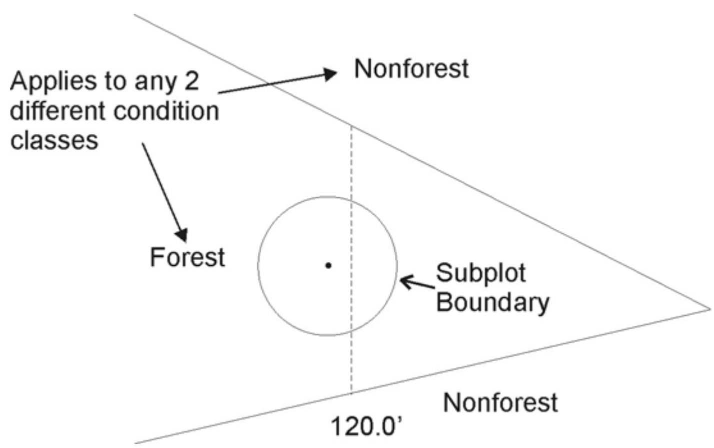


Figure 3. Forest condition narrows within a nonforest land condition. Examine the location of the subplot center in reference to the approximate line where the forest narrows to 120.0 ft wide. In this example, the entire subplot is classified as forest.

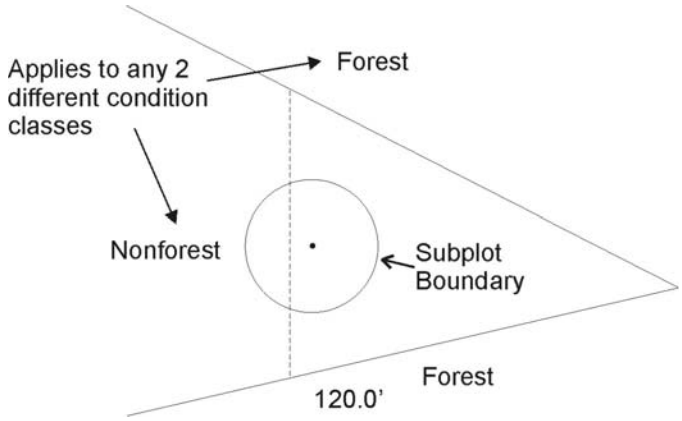


Figure 4. Nonforest land condition narrows within a forest condition. Examine the location of the subplot center in reference to the approximate line where the nonforest narrows to 120.0 ft wide. In this example, the entire subplot is classified as forest.

2. Nonforest Land

Nonforest land is any land within the sample that does not meet the definition of accessible forest land or any of the CONDITION CLASS STATUS values defined in number 3 and 4 in Section 2.2. To qualify, the area must be at least 1.0 acre in size and 120.0 feet wide; five exceptions are discussed at the beginning of Section 2.4. Do not consider evidence of "possible" or future development or conversion. A nonforest land condition will remain in the sample and will be examined at the next plot visit to see if it has become forest land.

3. Noncensus Water

Lakes, reservoirs, ponds, and similar bodies of water 1.0 acre to 4.5 acres in size. Rivers, streams, canals, etc., 30.0 feet to 200 feet wide.

4. Census Water

Lakes, reservoirs, ponds, and similar bodies of water 4.5 acres in size and larger; and rivers, streams, canals, etc., more than 200 feet wide (1990 U.S. Census definition).

5. Nonsampled

See section 2.4.3 CONDITION NONSAMPLED REASON for descriptions of land that qualifies as nonsampled. In cases where a condition is access-denied or hazardous land use, but obviously contains no forest land, record CONDITION CLASS STATUS = 2, 3 or 4. In cases where a condition is access-denied or hazardous land use and has the possibility of forest, record CONDITION CLASS STATUS = 5.

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	Attributes where a change causes a separate condition class
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	
2.5.7	OWNER CLASS	Ancillary - changes do not delineate a new condition 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	

2.5.24 PRESENT NONFOREST LAND USE (for area converted from accessible forest land condition class to nonforest land since last inventory).

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 (figs. 5 and 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.

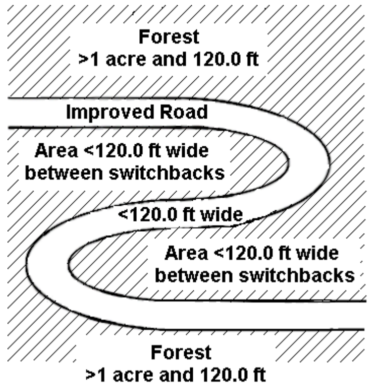


Figure 5. Example of a switchback road. All the cross-hatched area is forest and the improved road is a nonforest condition.

(b) Maintained rights-of-way: corridors created for railroads, power lines, gas lines, and canals that are periodically treated to limit the establishment and growth of trees and shrubs.

(c) Developments: structures and the maintained area next to a structure, all less than 1.0 acre in size and surrounded by forest land. Examples of developments are houses or trailers on very small lots, communication installations in a small cleared area within forest land, and barns and sheds.

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 (fig. 6).

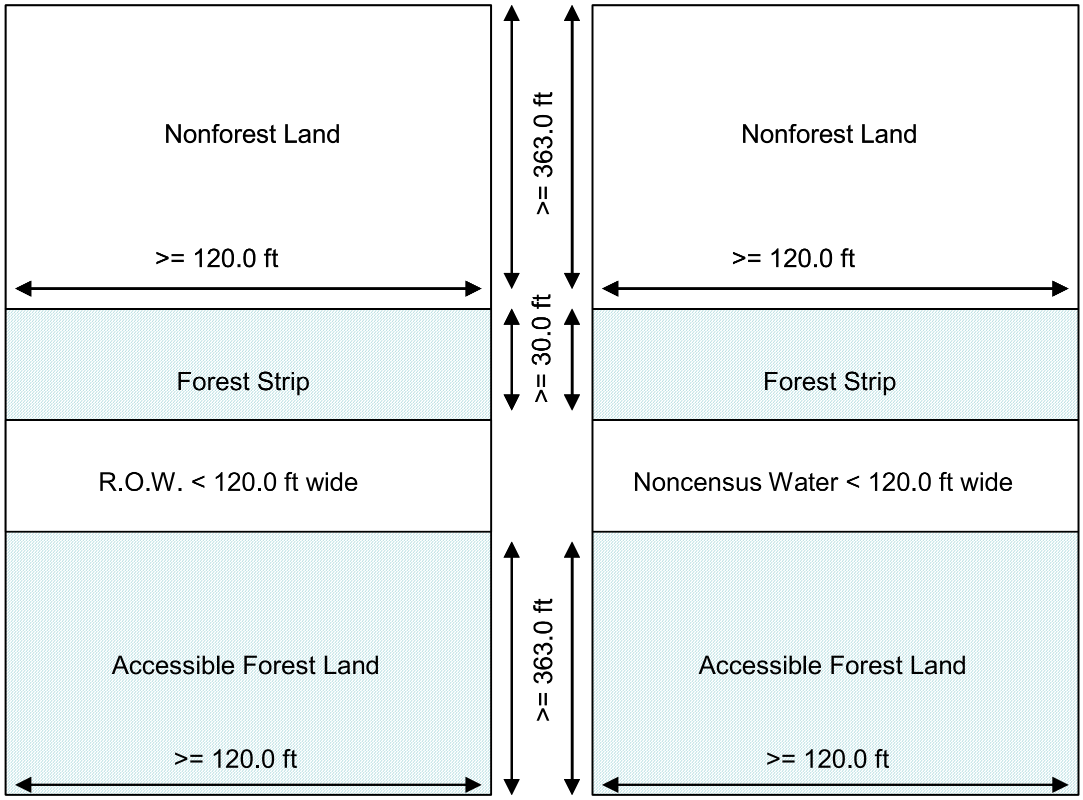


Figure 6. Example of nonforest and forest strips.

(a) Many small intermingled strips, determine the total area that the intermingled strips occupy, and classify according to the CONDITION CLASS STATUS (forest land or nonforest land) that occupies the greater area. If the area of intermingled strips is so large or indistinct as to make a total area determination impractical, then classify the sample as forest land.

(b) Two alternating strips: 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.

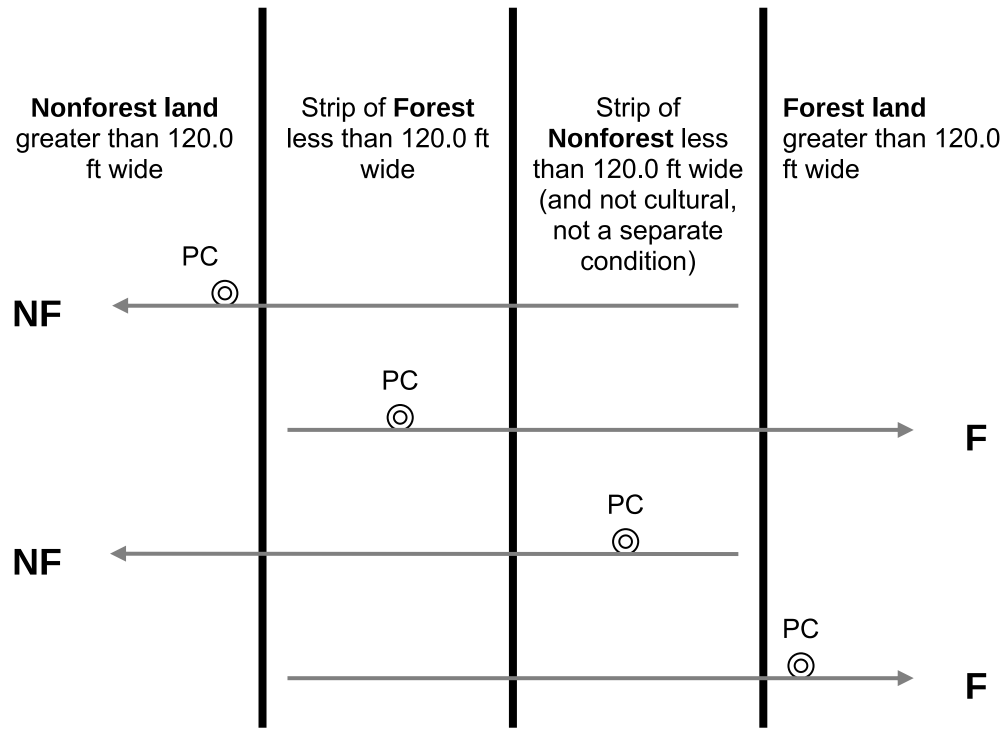


Figure 7. Example of alternating strips of forested and nonforested conditions. PC is the plot center (center of subplot 1).

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

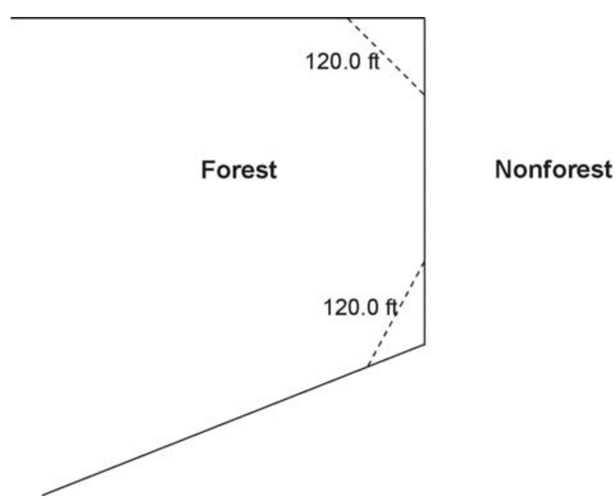


Figure 8. Illustration of the 90 degree corner rule. The dotted lines do not create nonforest land conditions.

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.

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

2.4.1 CONDITION CLASS NUMBER

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

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

2.4.2 CONDITION CLASS STATUS

Record the code that describes the sampling status of the condition class. The instructions in Sections 2.3 and 2.4 apply when delineating condition classes that differ by CONDITION CLASS STATUS. In situations where a condition is denied access or hazardous, but obviously contains no forest land, record CONDITION CLASS STATUS = 2, 3 or 4. In cases where a condition is access-denied or hazardous land use and has the possibility of forest, record CONDITION CLASS STATUS = 5.

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 – possibility of forest land

2.4.3 CONDITION NONSAMPLED REASON

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

When collected: When CONDITION CLASS STATUS = 5
Field width: 2 digits
Tolerance: No errors
MQO: At least 99% of the time
Values:

01 Outside U.S. boundary – Assign this code to condition classes beyond the U.S. border.

02 Denied access area – Any area within the sampled area of a plot to which access is denied by the legal owner, or to which an owner of the only reasonable route to the plot denies access. There are no minimum area or width requirements for a condition class delineated by denied access. Because a denied-access condition can become accessible in the future, it remains in the sample and is re-examined at the next occasion to determine if access is available.

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.

10 Other – This code is used whenever a 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.

11 Ocean – Condition falls in ocean water below mean high tide line.

2.4.4 NONFOREST CONDITION CLASS STATUS

Record the code that describes the sampling status of the condition class (see the nonforest nonsampled reasons below for additional information).

When collected: When CONDITION CLASS STATUS = 2 and NONFOREST SAMPLING STATUS = 1
Field width: 1 digit
Tolerance: No errors
MQO: At least 99% of the time
Values:

2 Accessible nonforest land
5 Nonsampled nonforest

2.4.5 NONFOREST CONDITION NONSAMPLED REASON

For portions of plots that are nonforest land and can not be sampled (NONFOREST CONDITION CLASS STATUS = 5), record one of the following reasons.

When collected: When CONDITION CLASS STATUS = 2 and NONFOREST SAMPLING STATUS = 1 and NONFOREST CONDITION STATUS = 5
Field width: 2 digits
Tolerance: No errors
MQO: At least 99% of the time

Values:

02 Denied access – 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.

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.

10 Other – This code is used whenever a 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.

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. <u>Distinct boundary within a macroplot (if applicable), subplot, or microplot</u> – 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. <u>Indistinct boundary within a subplot</u> – Separate condition classes are NOT recognized if the prospective condition classes abut along an indistinct transition zone, rather than on an abrupt, obvious boundary. Only one condition is recognized, and the subplot is classified entirely as the condition it most resembles.

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

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

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

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

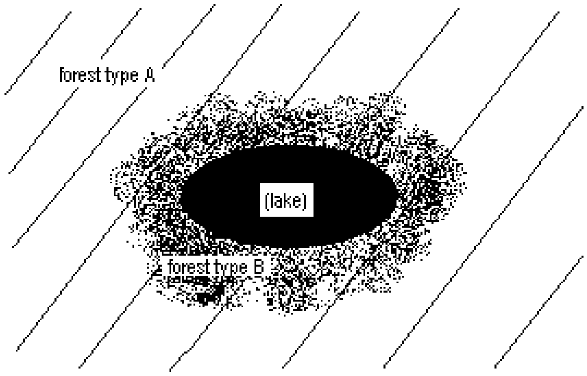


Figure 9. Forest type B is a separate condition class (riparian) if the band of it is between 30.0 feet and 120.0 feet wide, and is ≥ 1.0 acre in size.

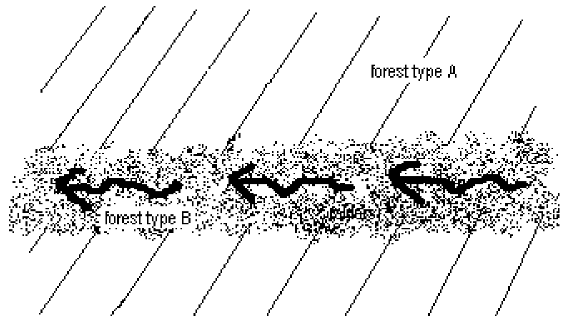


Figure 10. Forest type B is a separate condition class (riparian) if the band of it is between 30.0 feet and 120.0 feet wide, and is ≥ 1.0 acre in size.

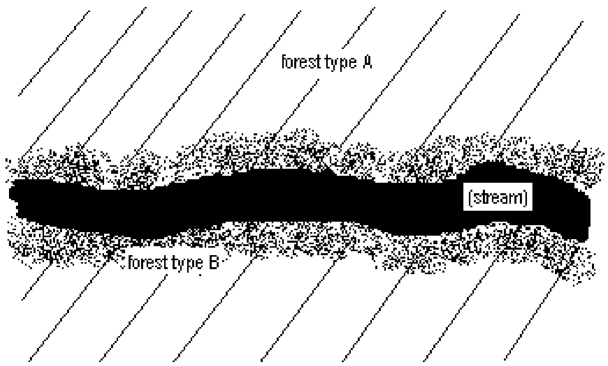


Figure 11. If the stream is < 30.0 feet wide, forest type B is a separate condition class (riparian) if the sum of the two widths of the bands, including the stream falls between 30.0 feet and 120.0 feet wide, and is ≥ 1.0 acre in size.

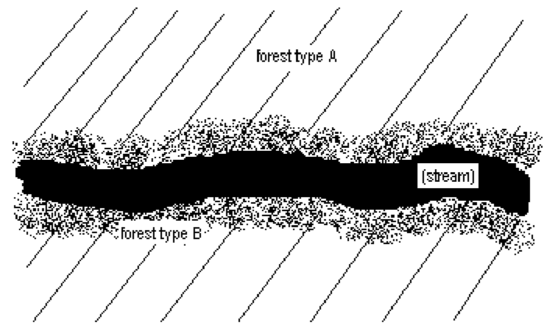


Figure 12. If the stream is > 30.0 feet wide, forest type B is a separate condition class (riparian) if either of the two widths of the bands falls between 30.0 feet and 120.0 feet wide and is ≥ 1.0 acre in size.

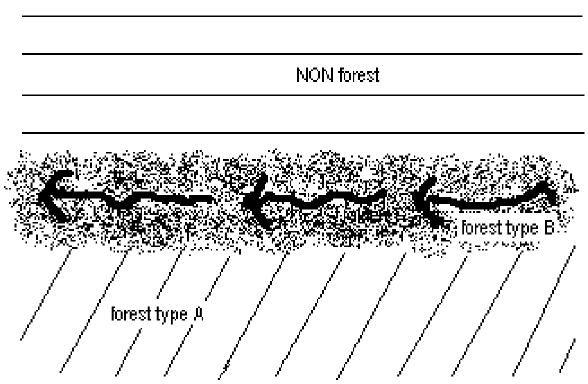


Figure 13. Forest type B is a separate condition class (riparian) if the band of it is between 30.0 feet and 120.0 feet wide, and is ≥ 1.0 acre in size.

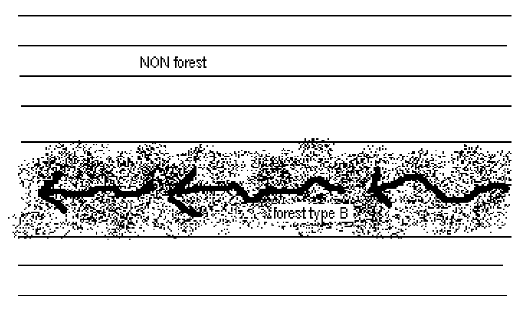


Figure 14. In a nonforested area, a band of forest type B that is < 120.0 feet wide is NOT considered a riparian area. It is not a separate condition class at all.

2.5.1 RESERVED STATUS

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.

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

0	Not reserved
1	Reserved

2.5.2 OWNER GROUP

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

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

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

2.5.3 FOREST TYPE

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

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

- For SAMPLE KIND = 2 plots, record the FOREST TYPE of the condition at the previous inventory.
- For all other plots:
    1. Evaluate any seedlings available to determine the FOREST TYPE.

2. If no seedlings exist, use adjacent stands and your best professional judgment to determine FOREST TYPE.

When collected: All accessible forest land condition classes (CONDITION CLASS STATUS = 1)
Field width: 3 digits
Tolerance: No errors in group or type
MQO: At least 99% of the time in group; at least 95% of the time in type. No MQO when STAND SIZE CLASS = 0.
Values: See Appendix 2

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

2.5.4 STAND SIZE CLASS

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

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

0 Nonstocked
Meeting the definition of accessible forest land, and one of the following applies:

(a) less than 10 percent stocked by trees of any size, and not classified as cover trees (see code 6), or

(b) for several woodland species where stocking standards are not available, less than 5 percent **crown cover** of trees of any size.

1 $\leq$ 4.9 inches (seedlings / saplings)
At least 10 percent stocking (or 5 percent crown cover if stocking standards are not available) in trees of any size; and at least 2/3 of the crown cover is in trees less than 5.0 inches DBH/DRC.

2 5.0 – 8.9 inches (softwoods) / 5.0 – 10.9 inches (hardwoods)
At least 10 percent stocking (or 5 percent crown cover if stocking standards are not available) in trees of any size; and at least 1/3 of the crown cover is in trees greater than or equal to 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 or equal to 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

or equal to 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 or equal to 5.0 inches DBH/DRC **and** the plurality of the crown cover is in trees $\geq$ 40.0 inches DBH.

6 Cover trees (trees not on species list, used for plots classified as nonforest)
Less than 10 percent stocking by trees of any size, and greater than 5 percent **crown cover** of species that comprise cover trees.

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

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

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

2.5.5 REGENERATION STATUS

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

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

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

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

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

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

2.5.6 TREE DENSITY

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

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

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

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

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

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

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

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

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

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

Ancillary (Non-Delineating) Variables

2.5.7 OWNER CLASS

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

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

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

11	National Forest
12	National Grassland
13	Other Forest Service

Owner Classes within Other Federal Lands (Owner Group 20)

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

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

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

Owner Classes within Private lands (Owner Group 40)

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

2.5.8 PRIVATE OWNER INDUSTRIAL STATUS

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

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

When collected: CORE: All accessible forest land condition classes (CONDITION CLASS STATUS = 1) when the owner group is private (OWNER GROUP 40)
CORE OPTIONAL: All accessible forest land condition classes (CONDITION CLASS STATUS = 1) when the owner group is private (OWNER GROUP 40) and nonforest land condition classes (CONDITION CLASS STATUS > 1) when the owner group is private (OWNER GROUP 40)
Field width: 1 digit
Tolerance: No errors
MQO: At least 99% of the time
Values:

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

2.5.9 ARTIFICIAL REGENERATION SPECIES

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

When collected: All accessible forest land condition classes (CONDITION CLASS STATUS = 1) with evidence of artificial regeneration (REGENERATION STATUS = 1)
Field width: 4 digits
Tolerance: No errors
MQO: At least 99% of the time
Values: See Appendix 3

2.5.10 STAND AGE

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

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

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

(34 x 0.25) + (62 x 0.60) + (59 x 0.15) = 55 years.

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

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

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

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

When collected: All accessible forest land condition classes (CONDITION CLASS STATUS = 1)
Field width: 3 digits
Tolerance: +/- 10%
MQO: At least 95% of the time
Values: 000 to 997, 998, 999

2.5.11 DISTURBANCE 1

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

For initial plot establishment (SAMPLE KIND =1 or 3), the disturbance must be within the last 5 years. For remeasured plots recognize only those disturbances that have occurred since the previous inventory.

Disturbance codes require "significant threshold" damage, which implies mortality and/or damage to 25 percent of all trees in a stand or 50 percent of an individual species' count. Additionally, some disturbances affect land and/or vegetation, but initially may not affect vegetation 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) or accessible nonforest condition classes when nonforest is being sampled (NONFOREST SAMPLING STATUS = 1 and CONDITION CLASS STATUS = 2 and NONFOREST CONDITION CLASS STATUS = 2)
Field width: 2 digits
Tolerance: No errors
MQO: At least 99% of the time
Values:

Code	Definition
00	None - no observable disturbance
10	Insect damage
11	insect damage to understory vegetation
12	insect damage to trees, including seedlings and saplings
20	Disease damage
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
  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
  51 ice
  52 wind (includes hurricane, tornado)
  53 flooding (weather induced)
  54 drought
60 Vegetation (suppression, competition, vines)
70 Unknown/not sure/other (include in NOTES)
80 Human-caused damage – any significant threshold of human-caused damage not described in the DISTURBANCE codes listed or in the TREATMENT codes listed. Must include a plot-level note to describe further.
90 Geologic disturbances
  91 landslide
  92 avalanche track
  93 volcanic blast zone
  94 other geologic event
  95 earth movement/avalanches

2.5.12 DISTURBANCE YEAR 1

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

When collected: When DISTURBANCE 1 > 00
Field width: 4 digits
Tolerance: +/- 1 year for measurement cycles of 5 years
+/- 2 years for measurement cycles of > 5 years
MQO: At least 99% of the time
Values: Since the previous plot visit, or the past 5 years for plots visited for the first time; 9999

2.5.13 DISTURBANCE 2

Record the second disturbance here. See DISTURBANCE 1 for coding instructions.

2.5.14 DISTURBANCE YEAR 2

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

2.5.15 DISTURBANCE 3

Record the third disturbance here. See DISTURBANCE 1 for coding instructions.

2.5.16 DISTURBANCE YEAR 3

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

2.5.17 TREATMENT 1

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

For initial plot establishment (SAMPLE KIND = 1 or 3), 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), or accessible nonforest condition classes when nonforest is being sampled (NONFOREST SAMPLING STATUS = 1 and CONDITION CLASS STATUS = 2 and NONFOREST CONDITION CLASS STATUS = 2)
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, or other activities (not covered by codes 10-40) designed to improve the commercial value of the residual stand, or chaining, which is a practice used on woodlands to encourage wildlife forage.

2.5.18 TREATMENT YEAR 1

Record the year in which TREATMENT 1 occurred.

When collected: When TREATMENT 1 > 00
Field width: 4 digits
Tolerance: +/- 1 year for measurement cycles of 5 years
+/- 2 years for measurement cycles of > 5 years
MQO: At least 99% of the time
Values: Since the previous plot visit, or the past 5 years for plots visited for the first time

2.5.19 TREATMENT 2

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

2.5.20 TREATMENT YEAR 2

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

2.5.21 TREATMENT 3

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

2.5.22 TREATMENT YEAR 3

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

2.5.23 PHYSIOGRAPHIC CLASS

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

When collected: All accessible forest land condition classes (CONDITION CLASS STATUS = 1), or accessible nonforest condition classes when nonforest is being sampled (NONFOREST SAMPLING STATUS = 1 and CONDITION CLASS STATUS = 2 and NONFOREST CONDITION CLASS STATUS = 2)
Field width: 2 digits
Tolerance: No errors
MQO: At least 80% of the time
Values:

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.

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 for all nonforest condition classes. For areas that were sampled and classified at last inventory as accessible forest land and are 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. Select the classification for the new nonforest condition that, within sampled area, indicates what the majority of this changed area is now if more than one nonforest classes are present.

When collected: CORE: SAMPLE KIND = 2, current CONDITION CLASS STATUS = 2,
CORE OPTIONAL: SAMPLE KIND = 1, 2, or 3; 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 (with the exception of windbreak/shelterbelt, which has no minimum width.) Use the 10 code only for cases not better described by one of the following:

- 11 Cropland
- 12 Pasture (improved through cultural practices)
- 13 Idle farmland
- 14 Orchard
- 15 Christmas tree plantation
- 16 Maintained wildlife opening
- 17 Windbreak/Shelterbelt

20 Rangeland - Land primarily composed of grasses, forbs, or shrubs. This includes lands vegetated naturally or artificially to provide a plant cover managed like native vegetation and does not meet the definition of pasture. The area must be at least 1.0 acre in size and 120.0 feet wide.

30 Developed - Land used primarily by humans for purposes other than forestry or agriculture. Use the 30 code only for land not better described by one of the following:

- 31 Cultural: business (industrial/commercial), residential, and other places of intense human activity.
- 32 Rights-of-way: improved roads, railway, power lines, maintained canal
- 33 Recreation: parks, skiing, golf courses
- 34 Mining

40 Other - Land parcels greater than 1.0 acre in size and greater than 120.0 feet wide, which do not fall into one of the uses described above. Examples include undeveloped beaches, barren land (rock, sand), marshes, bogs, ice, and snow. Use the 40 code only for cases not better described by one of the following:

- 41 Nonvegetated
- 42 Wetland
- 43 Beach
- 45 Nonforest-Chaparral

2.5.25 CANOPY COVER SAMPLE METHOD
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.

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 ≥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.

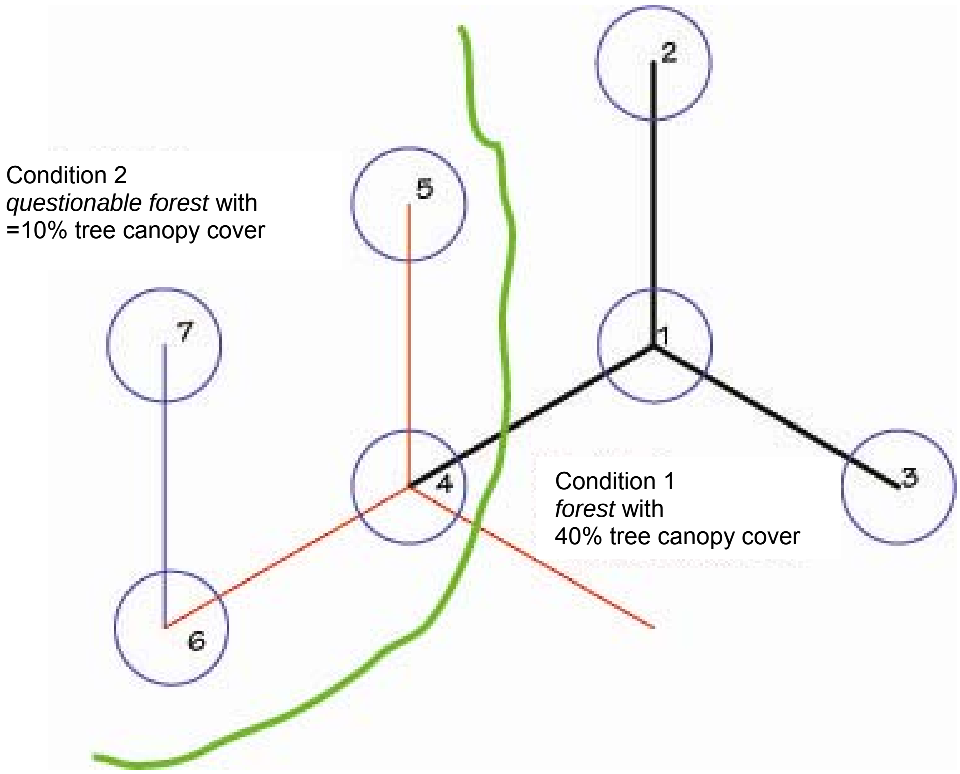


Figure 15. Example of the subplot method phantom subplots.

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 and be sampled as accessible forestland. If the sample of the subplot method does not reach the 10% threshold for LIVE PLUS MISSING CANOPY COVER, the stem counts are used to determine if there are 200 live stems per acre. Stem counts on the subplot and micro plot have to meet the following tally combinations to be sampled as accessible forestland (assuming 4 subplots and microplots are used):

Microplot Count (<5.0 inch DIA)	Subplot Count (≥5.0 inch DIA)	Estimated Stems per Acre
3	0	225
2	9	204
1	21	201
0	34	204

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 if minimum 10% LIVE PLUS MISSING CANOPY COVER is reached (4356 sq ft), the crew samples all live, dead, and missing tree canopies on the one-acre sample plot (117.75 foot radius) as described above 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. If the one-acre plot tree count reaches the sum of 200 stems of any combination of trees, seedlings and saplings, the condition will be sampled as accessible forestland.
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).

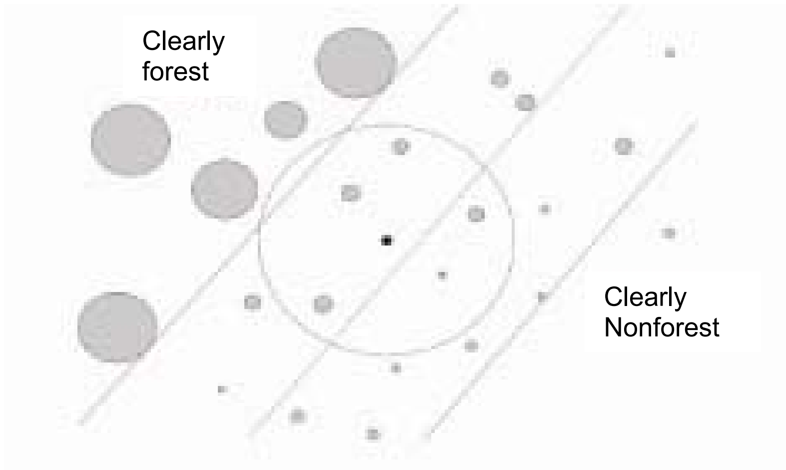


Figure 16. Example of classifying the condition class of the subplot in a transition zone with forest/Nonforest encroachment.

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. If the 10% LIVE PLUS MISSING CANOPY COVER threshold is not met, the estimate of all live seedlings, saplings, and trees (stem count x appropriate stem count multiplier) must be 200 or greaterfor the condition to qualify as accessible forestland.
5. As with the acre and subplot method, the sub-acre sample plot(s) must fall entirely in the questionable condition.
6. 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

2.5.26 LIVE CANOPY COVER

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)).

- 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.

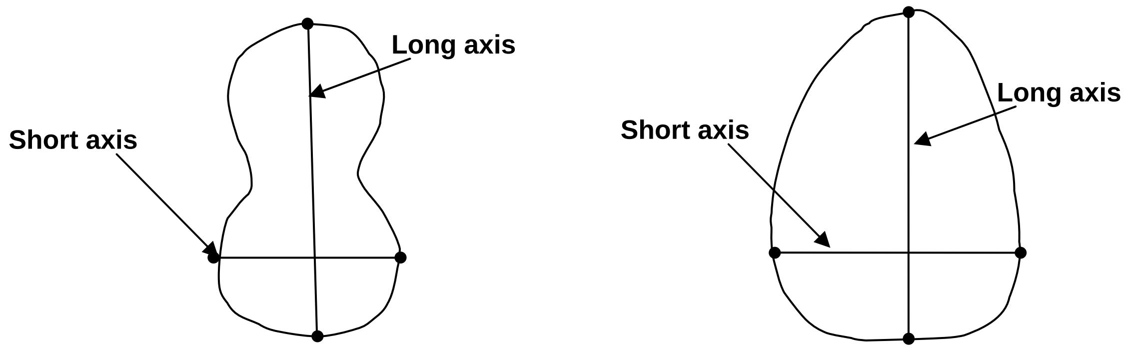


Figure 17. Examples of where to measure canopy widths.

LIVE CANOPY COVER can be based on an ocular estimate when the condition in question is certain to contain greater than 10% LIVE PLUS MISSING CANOPY COVER or TOTAL STEMS greater than 200.

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 %)

2.5.27 LIVE PLUS MISSING CANOPY COVER

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). Include live and dead and removed tally trees, saplings, and seedlings. 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%.

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 %)

2.5.28 TOTAL STEMS

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.

3.1 SUBPLOT NUMBER

Record the code corresponding to the number of the subplot.

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

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

3.2 SUBPLOT/MACROPLOT STATUS

Indicate whether or not this subplot currently has at least one accessible forest land condition class. In regions measuring the CORE OPTIONAL macroplpot, indicate whether or not this macroplot currently has at least one forested condition class. In situations where a subplot/macroplot is denied access or hazardous, but obviously contains no forest land, record SUBPLOT/MACROPLOT STATUS = 2. In cases where a subplot/macroplot is access-denied or hazardous land use and has the possibility of forest, record SUBPLOT/MACROPLOT STATUS = 3.

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 – possibility of forest land
4 Sampled – QA crew did not measure trees, saplings, or seedlings. QA crew did measure all other data items (condition, boundary, and subplot-level data). For use only on check plots (QA STATUS = 2 - 6). Not a legal entry on production plots (QA STATUS = 1 or 7).

3.3 SUBPLOT NONSAMPLED REASON

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

When collected: When SUBPLOT/MACROPLOT STATUS = 3
Field width: 2 digits
Tolerance: No errors
MQO: At least 99% of the time
Values:

01 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.

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

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.

11 Ocean – Subplot falls in ocean water below mean high tide line.

3.4 NONFOREST SUBPLOT/MACROPLOT STATUS

Record the code that describes the sampling status of the other-than-forest subplot, i.e., SUBPLOT/MACROPLOT STATUS = 2. In cases where subplot is denied access or hazardous, but obviously contains no nonforest land, i.e., subplot is either noncensus water or census water, record NONFOREST SUBPLOT/MACROPLOT STATUS = 2.

When collected: When NONFOREST SAMPLING STATUS = 1 and SUBPLOT/MACROPLOT STATUS = 2
Field width: 1 digit
Tolerance: no errors
MQO: At least 99% of the time
Values:

1 Sampled – at least one accessible nonforest land condition present on the subplot.
2 Sampled – no nonforest land condition present on subplot, i.e., subplot is either census and/or noncensus water.
3 Nonsampled nonforest

3.5 NONFOREST SUBPLOT/MACROPLOT NONSAMPLED REASON

For entire nonforest subplots that can not be sampled, record one of the following reasons.

When collected: When NONFOREST SAMPLING STATUS = 1 and SUBPLOT/MACROPLOT STATUS = 2 and NONFOREST SUBPLOT/MACROPLOT STATUS = 3
Field width: 2 digits
Tolerance: no errors
MQO: At least 99% of the time
Values:

02 Denied access – A subplot/macroplot to which access is denied by the legal owner, or to which an owner of the only reasonable route to the plot denies access. Because a denied-access subplot 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 situation – A subplot/macroplot 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.

04 Time limitation – This code applies to a full subplot/macroplot 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.

10 Other – This code is used whenever a subplot/macroplot 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.

3.6 SUBPLOT CENTER CONDITION

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

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

3.7 MICROPLOT CENTER CONDITION

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

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

3.8 SUBPLOT SLOPE

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

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

When collected: All subplots with at least one accessible forest land condition present on subplot (SUBPLOT/MACROPLOT STATUS = 1) or subplots with an accessible nonforest condition class present when nonforest is being sampled (NONFOREST SAMPLING STATUS = 1 and SUBPLOT/MACROPLOT STATUS = 2 and NONFOREST SUBPLOT/MACROPLOT STATUS = 1)
Field width: 3 digits
Tolerance: +/- 10%
MQO: At least 90% of the time
Values: 000 to 155

3.9 SUBPLOT ASPECT

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

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

When collected: All subplots with at least one accessible forest land condition present on subplot (SUBPLOT/MACROPLOT STATUS = 1) or subplots with an accessible nonforest condition class present when nonforest is being sampled (NONFOREST SAMPLING STATUS = 1 and SUBPLOT/MACROPLOT STATUS = 2 and NONFOREST 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

3.10 SNOW/WATER DEPTH

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

When collected: All subplots with at least one accessible forest land condition present on subplot (SUBPLOT/MACROPLOT PLOT STATUS = 1) or subplots with an accessible Nonforest condition class present when Nonforest is being sampled (NONFOREST SAMPLING STATUS = 1 ans SUBPLOT/MACROPLOT STATUS = 2 and NONFOREST SUBPLOT/MACROPLOT 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

3.11 SUBPLOT/MACROPLOT CONDITION LIST

This is a listing of all condition classes located within the 24.0-foot radius around the subplot center. In regions measuring the CORE OPTIONAL macroplot, this is a listing of all condition classes located within the 58.9-foot radius around the macroplot center. A maximum of four conditions is permitted at any individual subplot / macroplot. If a condition class has already been defined at a previously completed subplot / macroplot, use the same condition class number whenever that condition is encountered. Define new condition classes as they are encountered. If more than one condition class is listed here, boundary data are required. If only one condition class is listed, this condition is automatically assigned to the subplot center and microplot center. If less than four condition classes occur on this subplot, complete the remainder of this field with zeros. For example, if condition 1 is the only condition class on a subplot, record 1000.

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

4.0 BOUNDARY REFERENCES

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

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

4.1 Reference Procedure

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

Boundary referencing is done by recording azimuths and distances from subplot center to the reference points and/or from microplot center to the reference points (figs. 18 and 19). 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.

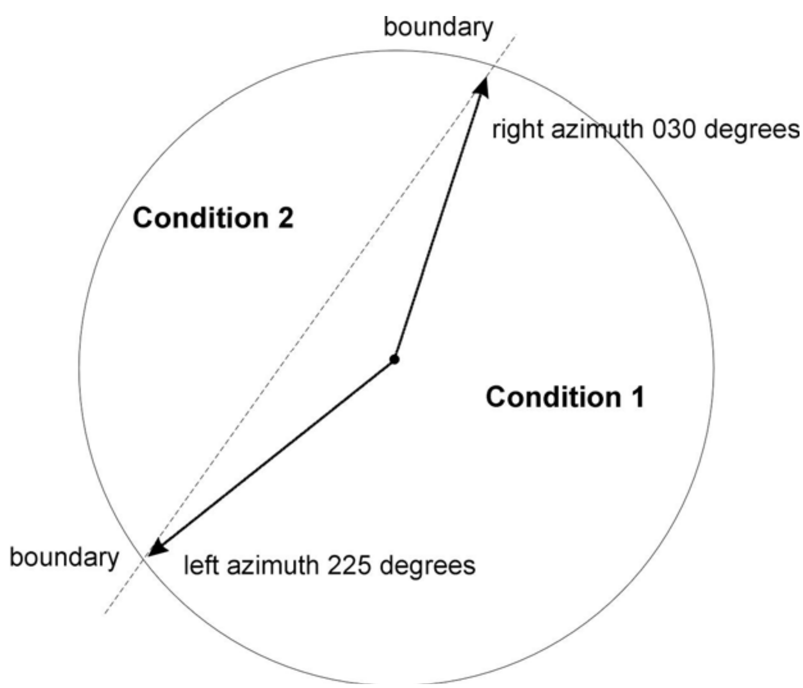


Figure 18. How to measure a straight boundary on a microplot, subplot, or macroplot.

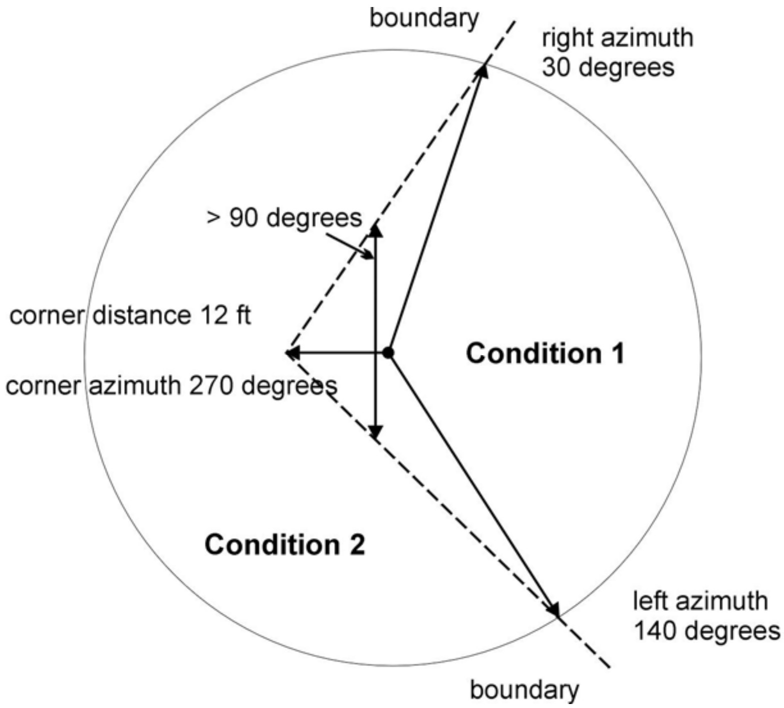


Figure 19. How to measure a boundary with a corner on a subplot or macroplot.

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

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

1. When a boundary between accessible forest land and nonforest land or between two contrasting accessible forest land condition classes is clearly marked, use that feature to define the boundary. Examples of clear demarcation are a fence line, plowed field edge, sharp ridge line, and water's edge along a stream course, ditch, or canal.

2. When a boundary between forest land and nonforest land is not clearly marked by an obvious feature, the boundary should follow the nonforest side of the stems of the trees at the forest edge.

3. When a boundary between two contrasting forest land condition classes is not clearly marked, map along the stems of the contrasting condition. When the boundary between two contrasting forest land condition classes is separated by a narrow linear inclusion (creek, fire line, narrow meadow, unimproved road), establish the boundary at the far edge of the inclusion relative to subplot center.

4. When a plot is remeasured, the crew will examine the boundaries referenced at last inventory. If no change has occurred, the current crew will retain the boundary data that were recorded at last inventory. If a boundary has changed, or a new boundary is

present, or the previous crew made an obvious error, record new or updated boundary data. Delete boundaries that are no longer distinct.

5. Although individual MQO's are specified for the azimuths and distances, in practice a crew will be considered 'correct' when the difference in areas as mapped by the original crew and by the QA crew is less than 10 percent of the subplot or microplot area. This allows for slight variations in azimuths or distances due to the approximate nature of mapping procedures.

4.2 Boundary Data

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

4.2.1 SUBPLOT NUMBER

Record the code corresponding to the number of the subplot.

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

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

4.2.2 PLOT TYPE

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

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

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

4.2.3 BOUNDARY CHANGE

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

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

Values:

- 0 No change - boundary is the same as indicated on plot map and/or data collected by a previous crew.
- 1 New boundary, or boundary data has been changed to reflect an actual on-the-ground physical change resulting in a difference from the boundaries recorded.
- 2 Boundary has been changed to correct an error from previous crew.
- 3 Boundary has been changed to reflect a change in variable definition.

4.2.4 CONTRASTING CONDITION

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

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

4.2.5 LEFT AZIMUTH

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

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

4.2.6 CORNER AZIMUTH

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

When collected: All boundaries
Field width: 3 digits
Tolerance: +/- 10 degrees
MQO: At least 90% of the time
Values: 000 to 360

4.2.7 CORNER DISTANCE

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

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

Values:

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

4.2.8 RIGHT AZIMUTH

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

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

5.0 TREE AND SAPLING DATA

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

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

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

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

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

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

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

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

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

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

The following apply at remeasurement:

- If at the previous visit a forked tree was recorded as two separate trees but should have been recorded as one tree, give one of the tree data lines a PRESENT TREE STATUS = 0, RECONCILE = 7 or 8, 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.

5.1 SUBPLOT NUMBER

Record the subplot number where the tree occurs.

When Collected: All live tally trees ≥ 1.0 in DBH/DRC and standing dead tally trees ≥ 5.0 in DBH/DRC
Field width: 1 digit
Tolerance: No errors
MQO: At least 99% of the time
Values:

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

5.2 TREE RECORD NUMBER

Record a code to uniquely and permanently identify each tree on a given subplot. The TREE RECORD NUMBERS must be unique within a subplot – being unique is more important than being sequential. In general, work clockwise from azimuth 001 to 360, and work outwards from subplot center to subplot perimeter. On remeasured plots, use the previously assigned tree number. Saplings tallied on microplots will retain their initially assigned tree number if they grow to tree size. Missed trees and ingrowth trees (trees that either grew over the 1.0-inch threshold on the microplot or grew onto the subplot) 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 ≥ 1.0 in DBH/DRC and standing dead tally trees ≥ 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

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 (fig. 20).

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

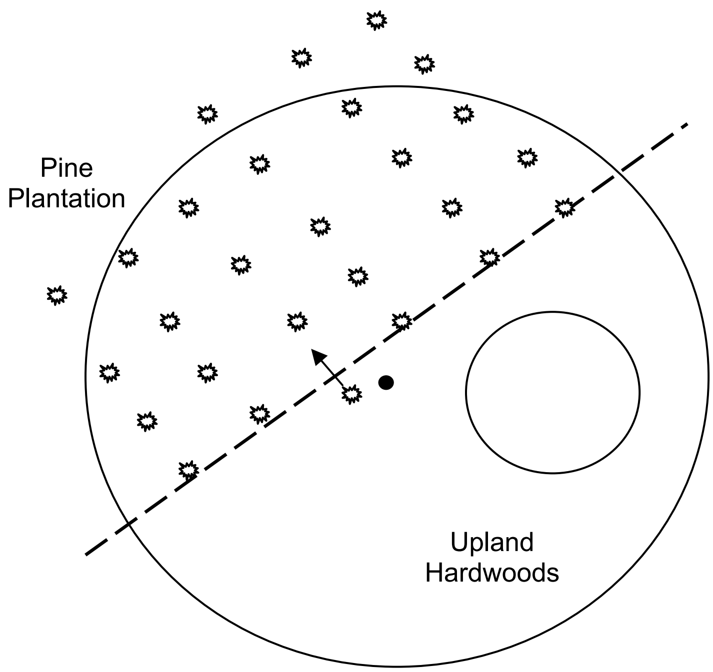


Figure 20. Ragged CONDITION CLASS boundary and tree condition class designation.

5.4 AZIMUTH

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

When Collected: All live tally trees ≥ 1.0 in DBH/DRC and standing dead tally trees ≥ 5.0 in DBH/DRC
Field width: 3 digits
Tolerance: +/- 10 degrees
MQO: At least 90% of the time
Values: 001 to 360

5.5 HORIZONTAL DISTANCE

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

When Collected: All live tally trees ≥ 1.0 inches DBH/DRC and standing dead tally trees ≥ 5.0 inches 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
Annular plot: +/- 3.0 ft
Annular plot woodland species: +/- 6.0 ft
MQO: At least 90% of the time
Values: Microplot: 00.1 to 06.8
Subplot: 00.1 to 24.0
Annular plot: 24.1 to 58.9

5.6 PREVIOUS TREE STATUS

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

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 the tree's volume 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. Requires RECONCILE code = 5-9.

1 Live tree – any live tree (new, remeasured or ingrowth)

2 Dead tree – any dead tree (new, remeasured, or ingrowth), regardless of cause of death. Includes all previously standing dead trees that no longer qualify as standing dead, as well as trees killed by silvicultural or land clearing activity, and are assumed not to have been utilized.

3 Removed – a tree that has been cut and removed by direct human activity related to harvesting, silviculture or land clearing (remeasurement plots only). The tree is assumed to have been utilized.

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

5.7.1 RECONCILE

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

When Collected: On SAMPLE KIND = 2; all new live tally trees ≥ 1.0 in DBH/DRC (PRESENT TREE STATUS = 1 and no PREVIOUS TREE STATUS), all new dead tally trees ≥ 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 – 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.

3 Missed live – a live tree missed at previous inventory and that is live or dead now.

4 Missed dead – a dead tree missed at previous inventory that is dead now.

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

5 Shrank – live tree that shrank below threshold diameter on microplot/subplot/macroplot.

6 Missing (moved) – tree was correctly tallied in previous inventory, but has now moved beyond the radius of the plot due to natural causes (i.e., small earth movement, hurricane). Tree must be either live before and still alive now or dead before and dead now. If tree was live before and now dead, this is a mortality tree and should have PRESENT TREE STATUS = 2 (not 0).

7 Cruiser error – erroneously tallied at previous inventory.

8 Procedural change – tree was tallied at the previous inventory, but is no longer tallied due to a definition or procedural change.

9 Tree was sampled before, but now the area where the tree was located is nonsampled. All trees on the nonsampled area have RECONCILE = 9.

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

5.7.2 STANDING DEAD

Record the code that describes whether or not a tree qualifies as standing dead. To qualify as a standing dead tally tree, dead trees must be at least 5.0 inches in diameter, have a bole which has an unbroken ACTUAL LENGTH of at least 4.5 feet, and lean less than 45 degrees from vertical as measured from the base of the tree to 4.5 feet. See figures 21-23 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.

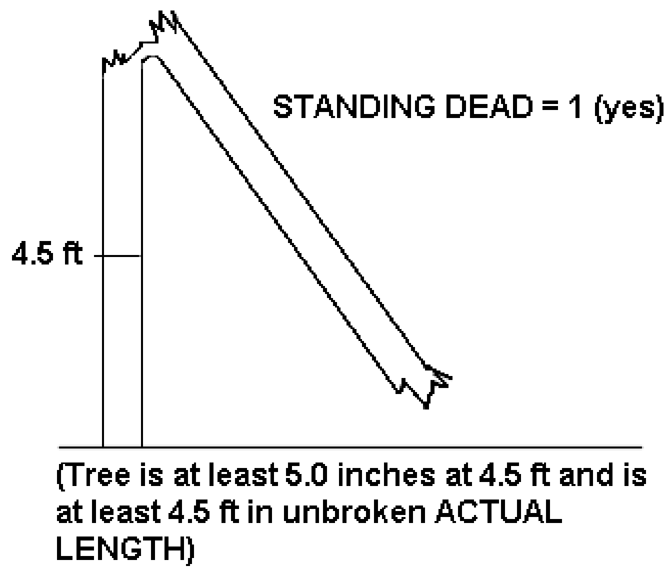


Figure 21. Example of an unbroken bole to 4.5 feet.

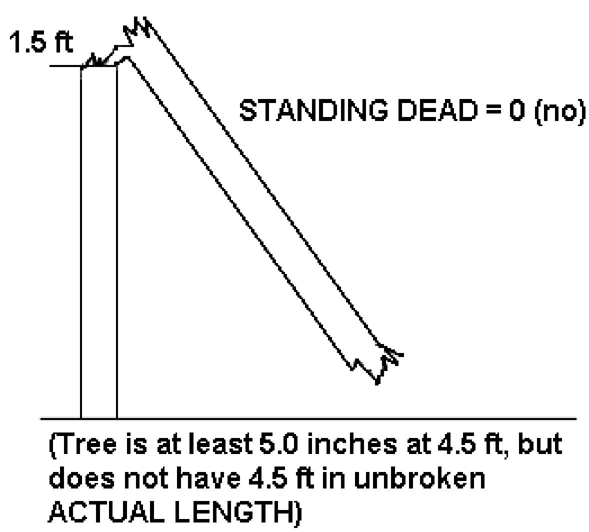


Figure 22. Example of an unbroken length of < 1.5 feet.

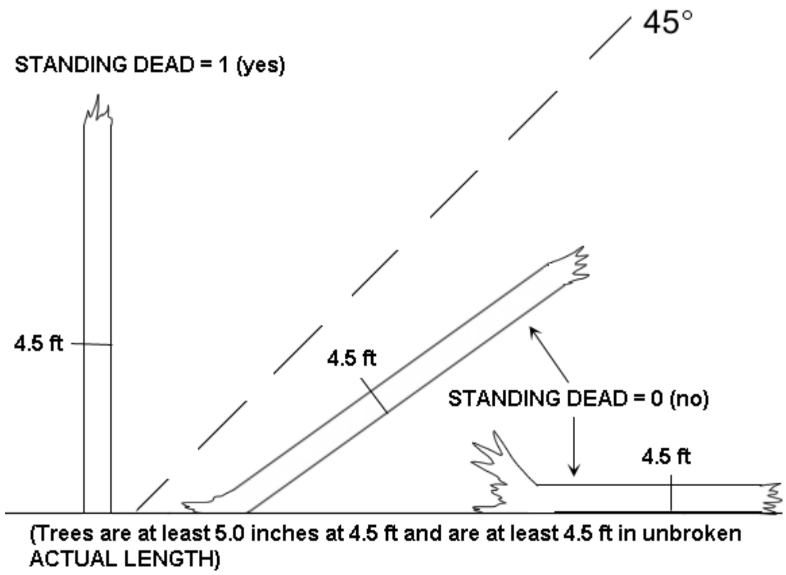


Figure 23. Other examples of dead trees.

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 the tree's volume to the proper component of volume change.

When Collected: All standing dead trees 5.0 inches DBH/DRC and larger that were live within the past 5 years if no previous inventory (PRESENT TREE STATUS = 2 on SAMPLE KIND = 1 or 3 plots).
Field width: 1 digit
Tolerance: No errors
MQO: At least 85% of the time
Values:

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

5.8 SPECIES

Record the appropriate SPECIES code from the list in Appendix 3. If a species is encountered that is not listed in Appendix 3 and it not clear if it should be tallied as a tree, consult the Field Supervisor. If the species cannot be determined in the field, tally the tree, but bring branch samples, foliage, cones, flowers, bark, etc. to the 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 ≥ 1.0 inches DBH/DRC and standing dead tally trees ≥ 5.0 inches DBH/DRC
Field width: 4 digits
Tolerance: No errors
MQO: At least 99% of the time for genus, at least 95% of the time for species
Values: See Appendix 3

5.9 DIAMETER

Diameters are measured at either breast height (DBH) or at the root collar (DRC). Species requiring DRC, referred to as woodland species, are denoted with a "w" in Appendix 3. Trees with diameters between 1.0- and 4.9-inches are measured on the 6.8-foot radius microplot, those with diameters of 5.0-inches and larger are measured on the 24-foot radius subplots. Macroplot tree diameter thresholds are determined according to regional specifications (see regional field guides for more information).

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

Remeasurement trees:

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

When Collected: All live tally trees ≥ 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
For woodland species: +/- 0.2 in per stem
MQO: At least 95% of the time. For example: a tree with a diameter of 41.0 in would have a tolerance of plus or minus 0.3 in. (Note: the MQO for point of measurement is +/- 0.2 in when the tree is first measured and within 1 ft of the location established by the previous crew when the tree is remeasured.)
Values: 001.0 to 999.9

5.9.1 PREVIOUS DIAMETER AT BREAST HEIGHT

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

5.9.2 DIAMETER AT BREAST HEIGHT (DBH)

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

Special DBH situations:

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

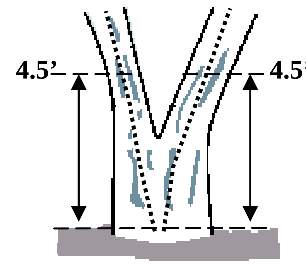


Figure 24. Forked below 1.0 ft.

- Trees forked below 1.0 foot. Trees forked below 1.0 foot are treated as distinctly separate trees (fig. 24). Distances and azimuths are measured individually to the center of each stem where it splits from the stump (fig. 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 (fig. 27-E), the rules in the next paragraph apply.

- Trees forked between 1.0 foot and 4.5 feet. Trees forked between 1.0 foot and 4.5 feet are also counted as separate trees (fig. 25), but only one distance and azimuth (to the central stump) is recorded for each stem (fig. 27 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.

  Multiple forks are possible if they all originate from approximately the same point on the main stem. In such cases, measure DBH on all stems at 3.5 feet above the common pith intersection (fig. 27-F).

  Once a stem is tallied as a fork that originated from a pith intersection between 1.0 and 4.5 feet, do not recognize any additional forks that may occur on that stem. Measure the diameter of such stems just below the base of stem separation as shown in figure 27-E (i.e., do not move the point of diameter the entire 3.5 feet above the first fork).

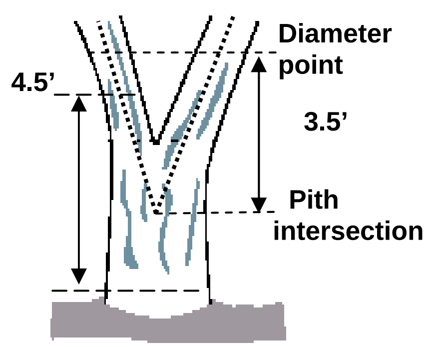


Figure 25. Forked between 1.0-4.5 ft.

- <u>Trees forked at or above 4.5 feet.</u> Trees forked at or above 4.5 feet count as one single tree (fig. 26). If a fork occurs at or immediately above 4.5 feet, measure diameter below the fork just beneath any swelling that would inflate DBH.

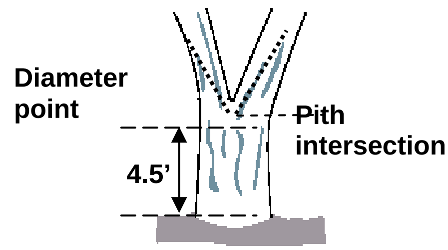


Figure 26. One tree.

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

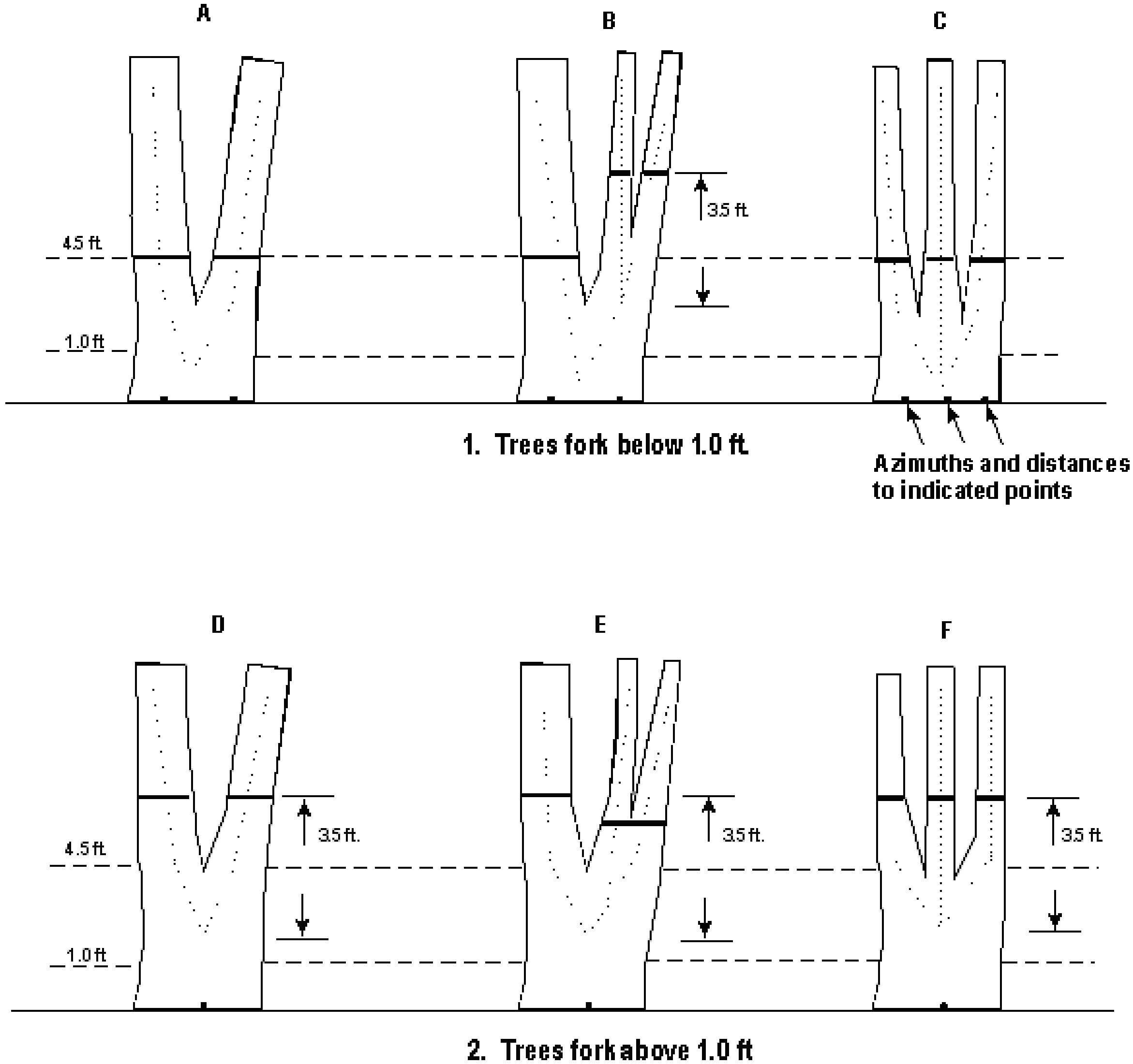


Figure 27. Summary of where to measure DBH, distance, and azimuth on forked trees.

3. Tree with butt-swell or bottleneck: Measure these trees 1.5 feet above the end of the swell or bottleneck if the swell or bottleneck extends 3.0 feet or more above the ground (fig. 28).

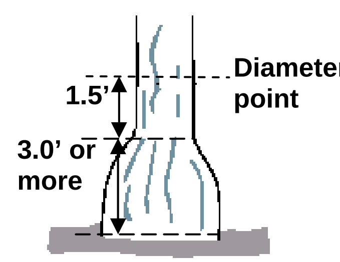


Figure 28. Bottleneck tree.

4. Tree with irregularities at DBH: On trees with swellings (fig. 29), bumps, depressions, and branches (fig. 30) at DBH, diameter will be measured immediately above the irregularity at the place it ceases to affect normal stem form.

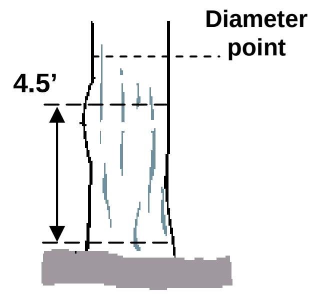


Figure 29. Tree with swelling.

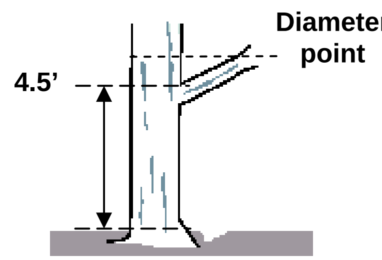


Figure 30. Tree with branch.

5. Tree on slope: Measure diameter at 4.5 feet from the ground along the bole on the uphill side of the tree (fig. 31).

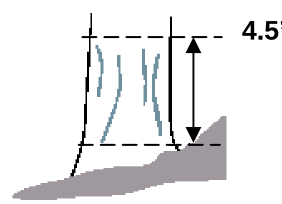


Figure 31. Tree on a slope.

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 (fig. 32).

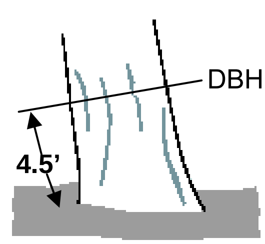


Figure 32. Leaning tree.

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 (fig. 33). 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 (figs. 29 and 30).

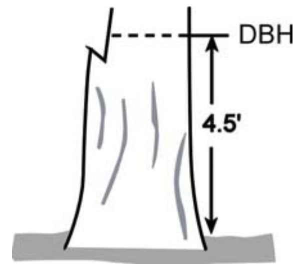


Figure 33. Tree with part of stem missing.

10. Live windthrown tree: Measure from the top of the root collar along the length to 4.5 feet (fig. 34).

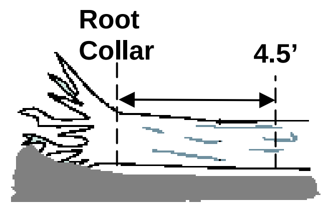


Figure 34. Tree on the ground.

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

   - If the pith of the main bole is above the duff layer, use the same forking rules specified for a forked tree, and take all measurements accordingly (fig. 35).

   - If the pith intersection of the main down bole and vertical tree-like branch occurs below 4.5 feet from the stump along the main bole, treat that branch as a separate tree, and measure DBH 3.5 feet above the pith intersection for both the main bole and the tree-like branch.

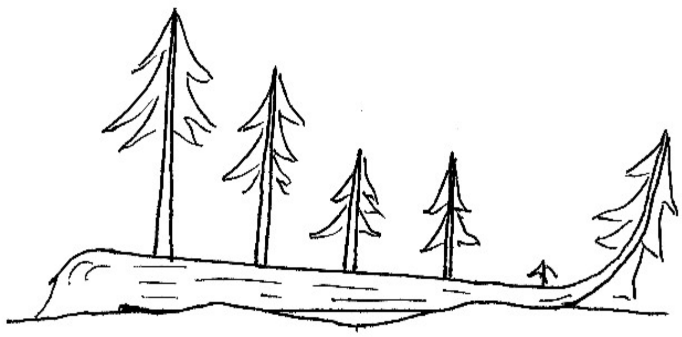


Figure 35. Down tree above duff.

- If the intersection between the main down bole and the tree-like branch occurs beyond the 4.5 feet point from the stump along the main bole, treat that branch as part of the main down bole.
- If the pith of main tree bole is below the duff layer, ignore the main bole, and treat each tree-like branch as a separate tree; take DBH and length measurements from the ground, not necessarily from the top of the down bole (fig. 36). 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.

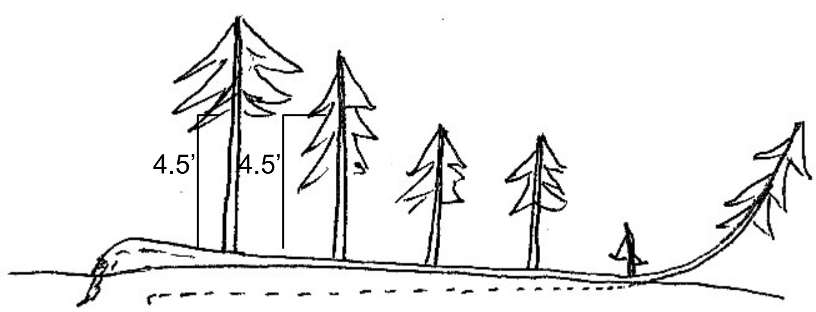


Figure 36. Down tree below duff.

12. Tree with curved bole (pistol butt tree): Measure along the bole on the uphill side (upper surface) of the tree (fig. 37).

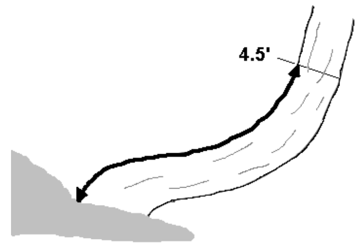


Figure 37. Tree with curved bole (pistol butt tree).

5.9.3 PREVIOUS DIAMETER AT ROOT COLLAR

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

5.9.4 Diameter At Root Collar (DRC)

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

Measuring woodland stem diameters: Before measuring DRC, remove the loose material on the ground (e.g., litter) but not mineral soil. Measure just above any swells present, and in a location so that the diameter measurements are a good representation of the volume in the stems (especially when trees are extremely deformed at the base). Stems must be at least 1 foot in length and at least 1.0 inch in diameter 1 foot up from the stem diameter measurement point to qualify for measurement. Whenever DRC is impossible or extremely difficult to measure with a diameter tape (e.g., due to thorns, extreme number of limbs), stems may be estimated and recorded to the nearest 1.0-inch class. Additional instructions for DRC measurements are illustrated in figure 38. For each qualifying stem of the woodland tree, measure and record DRC STEM DIAMETER (5.9.4.1) and indicate the DRC STEM STATUS (5.9.4.2).

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

Use the following formula to compute DRC:

$$DRC = SQRT [SUM (stem diameter^2)]$$

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

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

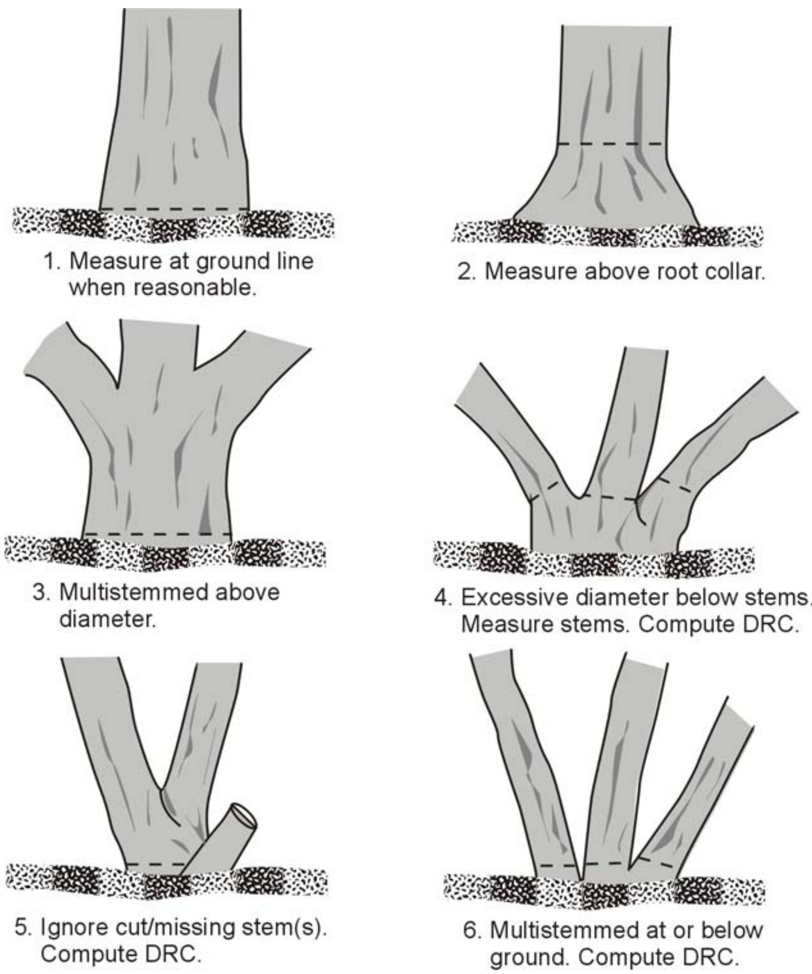


Figure 38. How to measure DRC in a variety of situations.

5.9.4.1 DRC STEM DIAMETER

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

When collected: All stems on woodland tree species that are at least 1 ft in length and at least 1.0 in in diameter 1 ft up from the stem diameter measurement point
Field width: 4 digits (xxx.y)
Tolerance: +/- 0.2 in per stem
MQO: At least 95% of the time
Values: 001.0 to 999.9

5.9.4.2 DRC STEM STATUS

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

When collected: All stems on woodland tree species that are at least 1 ft in length and at least 1.0 in in diameter 1 ft up from the stem diameter measurement point
Field width: 1 digit
Tolerance: No errors
MQO: At least 95% of the time
Values:

1	live stem
2	dead stem

5.10 PAST NUMBER OF STEMS

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

When collected: Value is preprinted for SAMPLE KIND = 2 locations
Field width: 2 digits
Tolerance: No errors
MQO: At least 90% of the time
Values: 1 to 99

5.11 CURRENT NUMBER OF STEMS

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

When collected: For tallied **woodland** species with at least one stem 1.0 in in diameter or larger; includes woodland species tallied on the microplot
Field width: 2 digits
Tolerance: No errors
MQO: At least 90% of the time
Values: 1 to 99

5.12 DIAMETER CHECK

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

When Collected: All live tally trees ≥ 1.0 in DBH/DRC and standing dead tally trees ≥ 5.0 in DBH/DRC
Field width: 1 digit
Tolerance: No errors
MQO: At least 99% of the time
Values:

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

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

5.13 ROTTEN/MISSING CULL

Record the percent rotten or missing cubic-foot cull for all live tally trees greater than or equal to 5.0 inches DBH/DRC (CORE) 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 DOB top. Do not include any cull estimate above ACTUAL LENGTH. For woodland species, the merchantable portion is between the point of DRC measurement to a 1.5-inch DOB top.

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.

When Collected: CORE: All live tally trees ≥ 5.0 in DBH/DRC
CORE OPTIONAL: 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

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

When Collected: Phase 2 CORE: All live tally trees ≥ 5.0 in DBH/DRC
Phase 2 CORE OPTIONAL: All live tally trees ≥ 1.0 in DBH/DRC and all standing dead tally trees ≥ 5.0 in DBH/DRC
Phase 3 CORE: All live tally trees ≥ 1.0 in DBH/DRC

Phase 3 CORE OPTIONAL: All live tally trees ≥ 1.0 in DBH/DRC, and all standing dead tally trees ≥ 5.0 in DBH/DRC

Field width: 3 digits
Tolerance: +/- 10 % of true length
MQO: At least 90% of the time
Values: 005 to 400

5.15 ACTUAL LENGTH

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

When Collected: Phase 2 CORE: All live and standing dead tally trees (with broken or missing tops) ≥ 5.0 in DBH/DRC
Phase 2 CORE OPTIONAL: 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
Phase 3 CORE: 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

5.16 LENGTH METHOD

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

When Collected: Phase 2 CORE: All live tally trees ≥ 5.0 in DBH/DRC
Phase 2 CORE OPTIONAL: All live tally trees ≥ 1.0 in DBH/DRC and all standing dead tally trees ≥ 5.0 in DBH/DRC
Phase 3 CORE: All live tally trees ≥ 1.0 in DBH/DRC
Phase 3 CORE OPTIONAL: All live tally trees ≥ 1.0 in DBH/DRC and all standing dead tally trees ≥ 5.0 in DBH/DRC

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

1 Total and actual lengths are field measured with a measurement instrument (e.g., clinometer, relascope, tape).

2 Total length is visually estimated, actual length is measured with an instrument.

3 Total and actual lengths are visually estimated.

5.17 CROWN CLASS

Rate tree crowns in relation to the sunlight received and proximity to neighboring trees (fig. 39). 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.

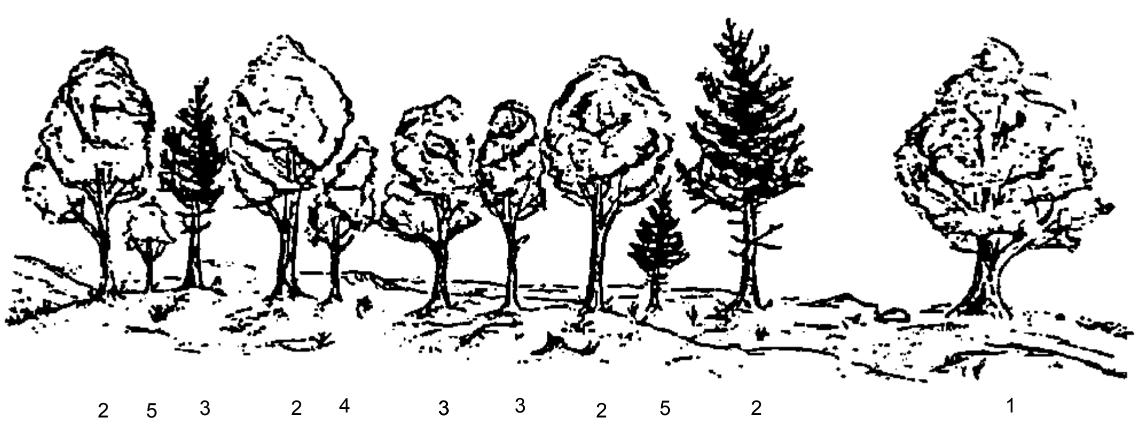


Figure 39. Examples of CROWN CLASS code definitions (numbers are the CROWN CLASS codes).

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 LENGTH (fig. 40). 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.

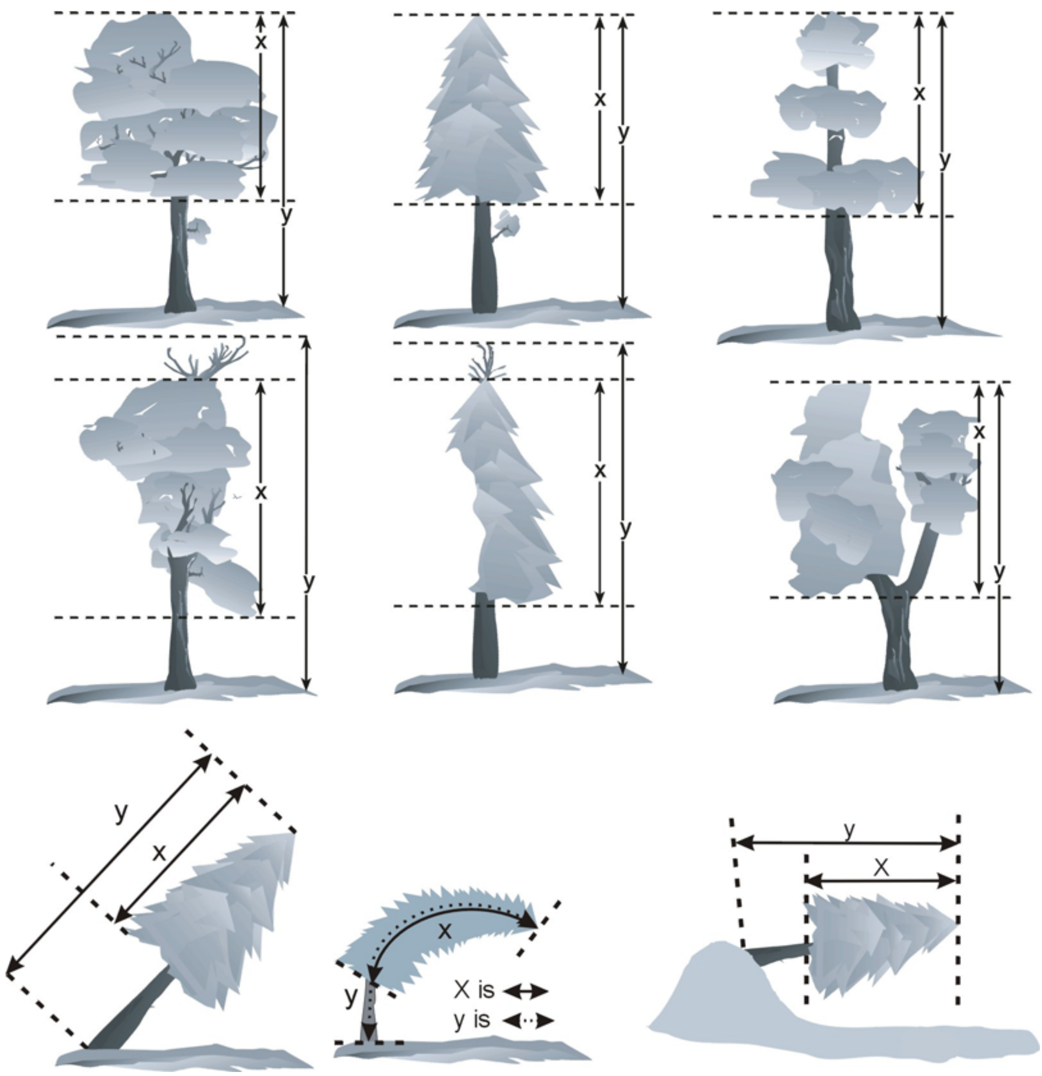


Figure 40. UNCOMPACTED LIVE CROWN RATIO examples.

Determine sapling UNCOMPACTED LIVE CROWN RATIO by dividing the live crown length by ACTUAL 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 (fig. 41).

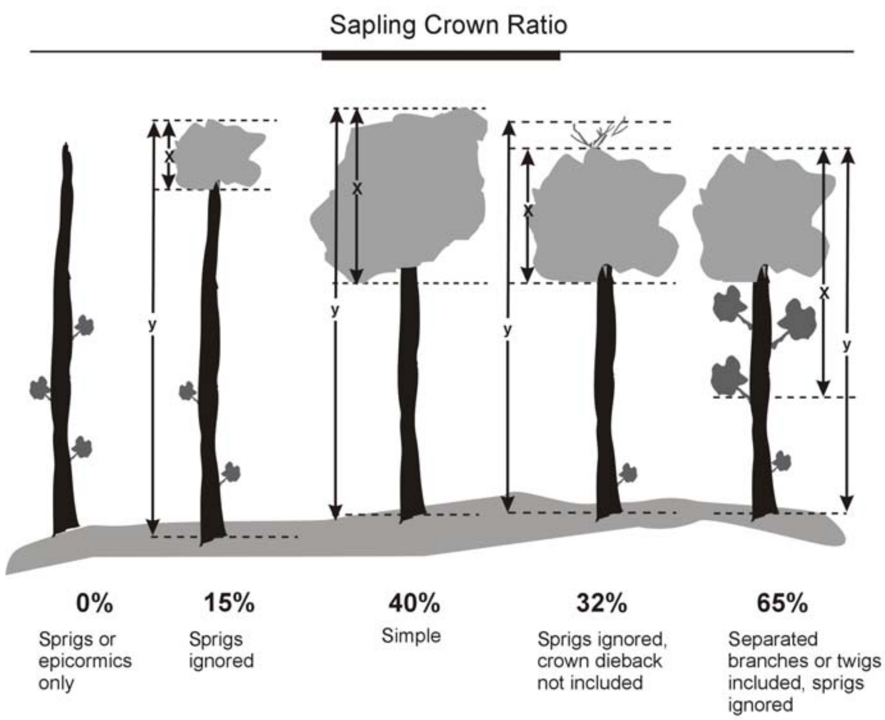


Figure 41. Sapling ratio determination examples.

When collected: Phase 2 CORE OPTIONAL: All live tally trees $\geq$ 5.0 in DBH/DRC
Phase 3 CORE: All live tally trees $\geq$ 1.0 in DBH/DRC
Field width: 2 digits
Tolerance: +/- 10%
MQO: At least 90% of the time
Values: 00 to 99 percent

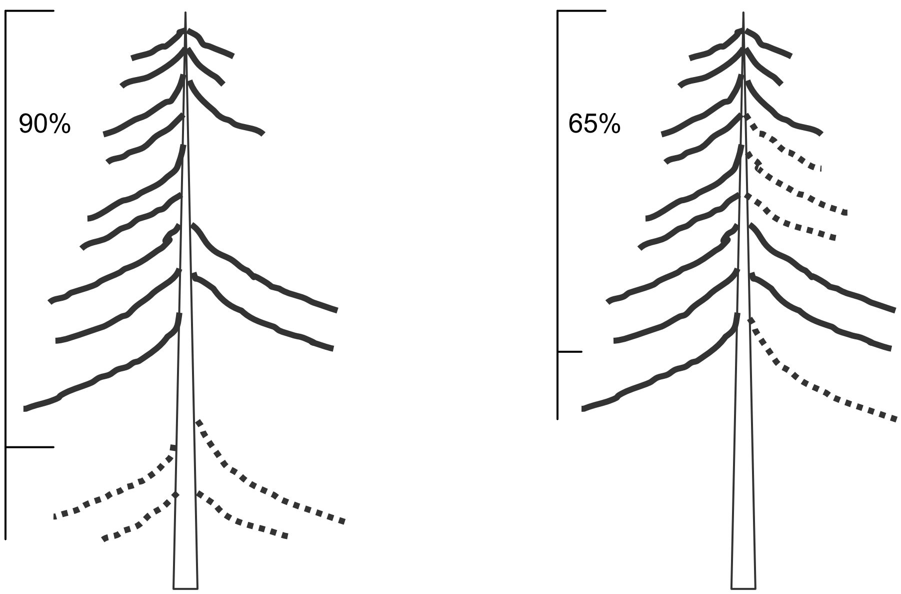
5.19 COMPACTED CROWN RATIO

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

Do not over-compact trees beyond their typical full crown situation. For example, if tree branches tend to average 2 feet between whorls, do not compact crowns any tighter than the 2-foot spacing (fig. 42). Figure 43 shows an example of COMPACTED CROWN RATIO on a leaning tree.

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

Uncompacted: Compacted:



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

Uncompacted: Compacted:

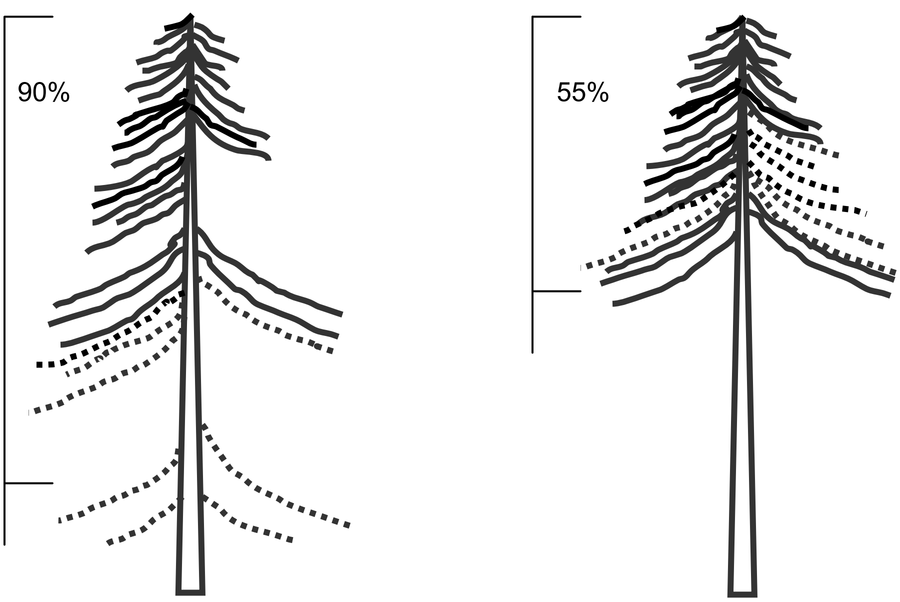


Figure 42. Examples of and comparison between COMPACTED CROWN RATIO and UNCOMPACTED LIVE CROWN RATIO of conifers.

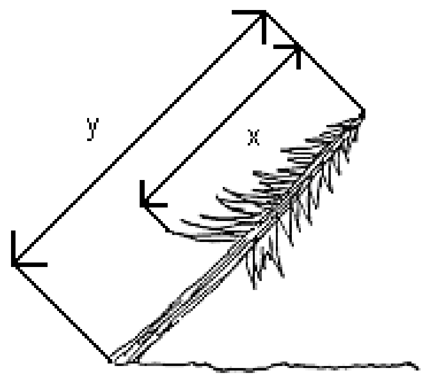


Figure 43. COMPACTED CROWN RATIO on a leaning tree. CROWN RATIO = (x/y)100.

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 (fig. 44).

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

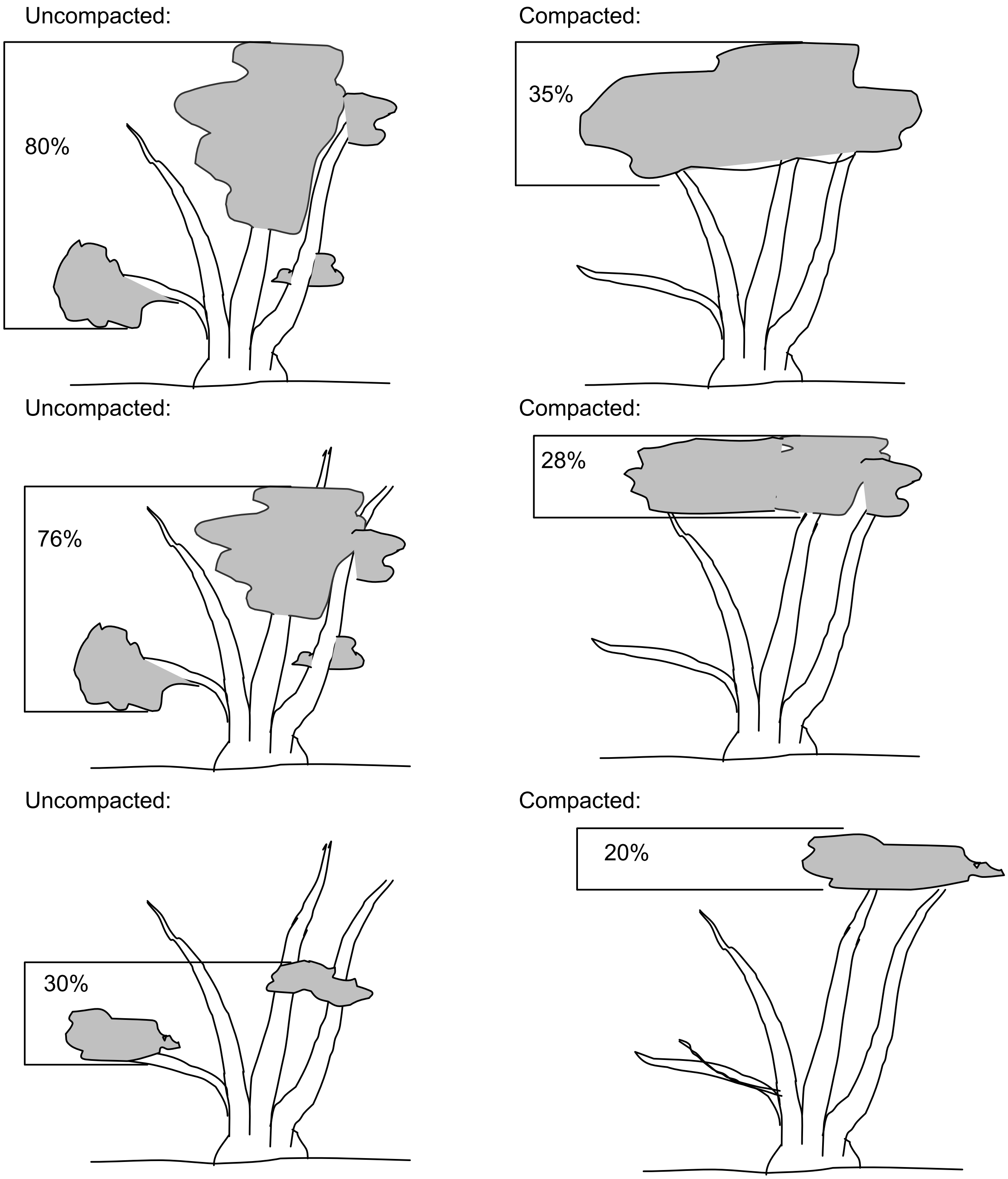


Figure 44. Examples of and comparison between COMPACTED CROWN RATIO and UNCOMPACTED LIVE CROWN RATIO of woodland species.

5.20 Tree Damage

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)

Record the location on the tree where DAMAGE TYPE 1 is found (fig. 45). 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 fig. 46). 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.

When Collected: CORE OPTIONAL: All live tally trees ≥ 5.0 in DBH/DRC
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.

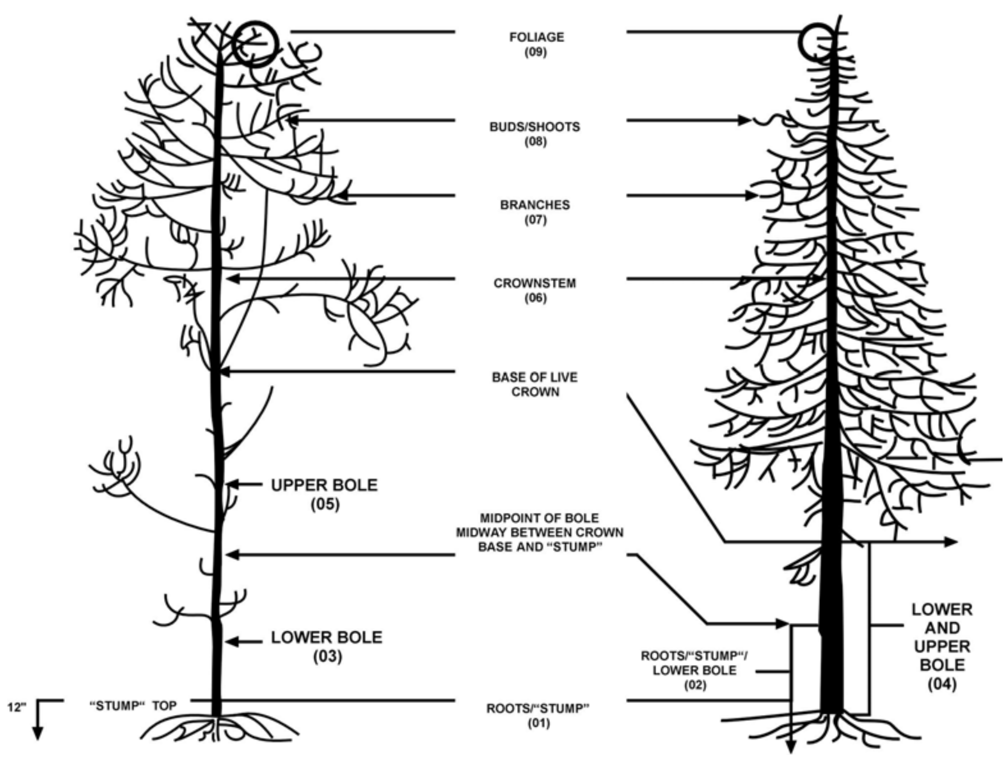


Figure 45. Location codes for damage.

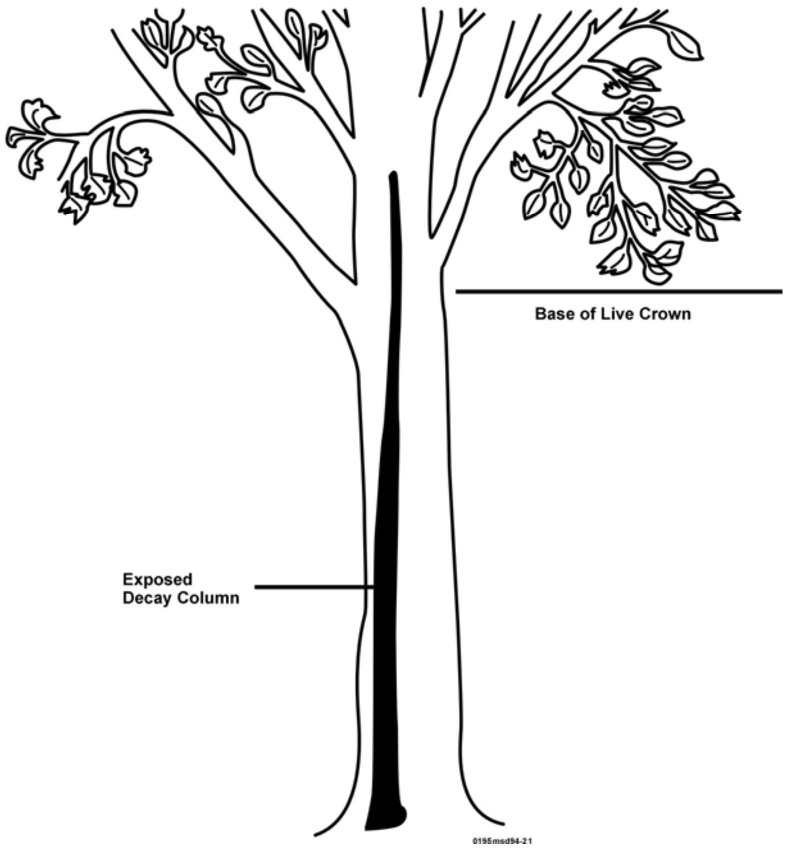


Figure 46. The damage runs from stump to crownstem. Code here should be 02 (roots and "stump" and lower bole) which represents the lowest locations of this multi-location damage.

5.20.2 DAMAGE TYPE 1 (CORE OPTIONAL)

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
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)

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
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 47.

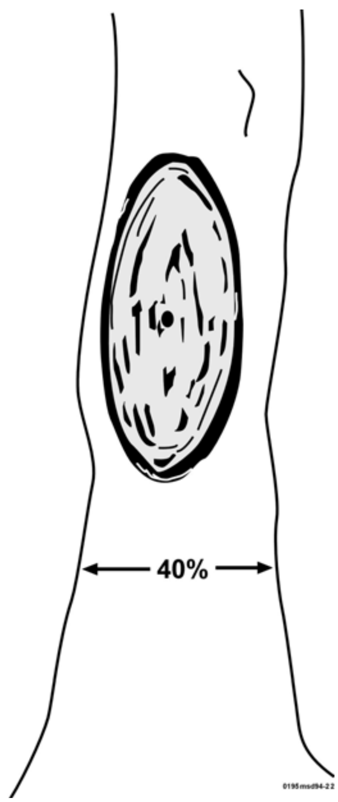


Figure 47. A canker which exceeds threshold. Since 40% of circumference is visible from any side, and since over half the visible side is taken up by the canker, it obviously exceeds the 20% minimum circumference threshold.

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 48.

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

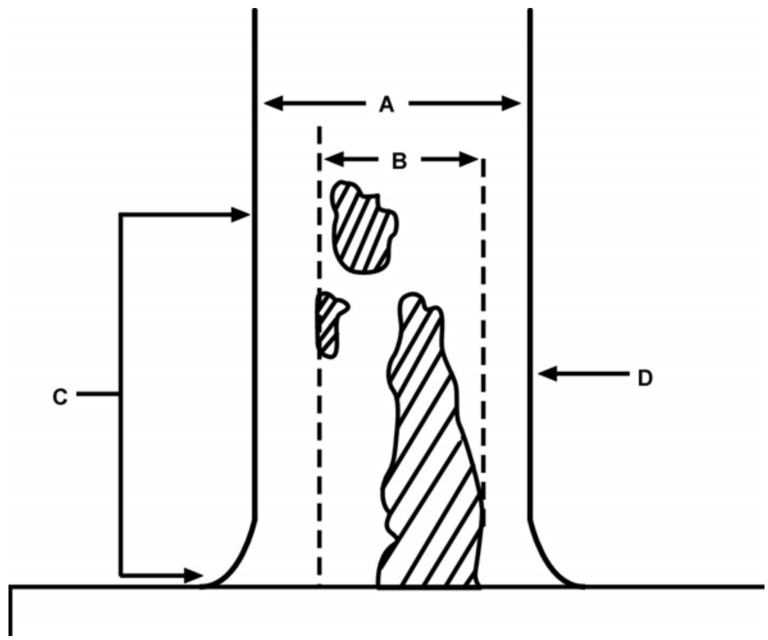


Figure 48. Multiple damage in "stump" and lower bole. A=approximately 40% of tree circumference; B=portion of tree circumference affected by damage; C=vertical distance within one meter; D=midpoint of occurrence at which circumference is measured.

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 49-55.

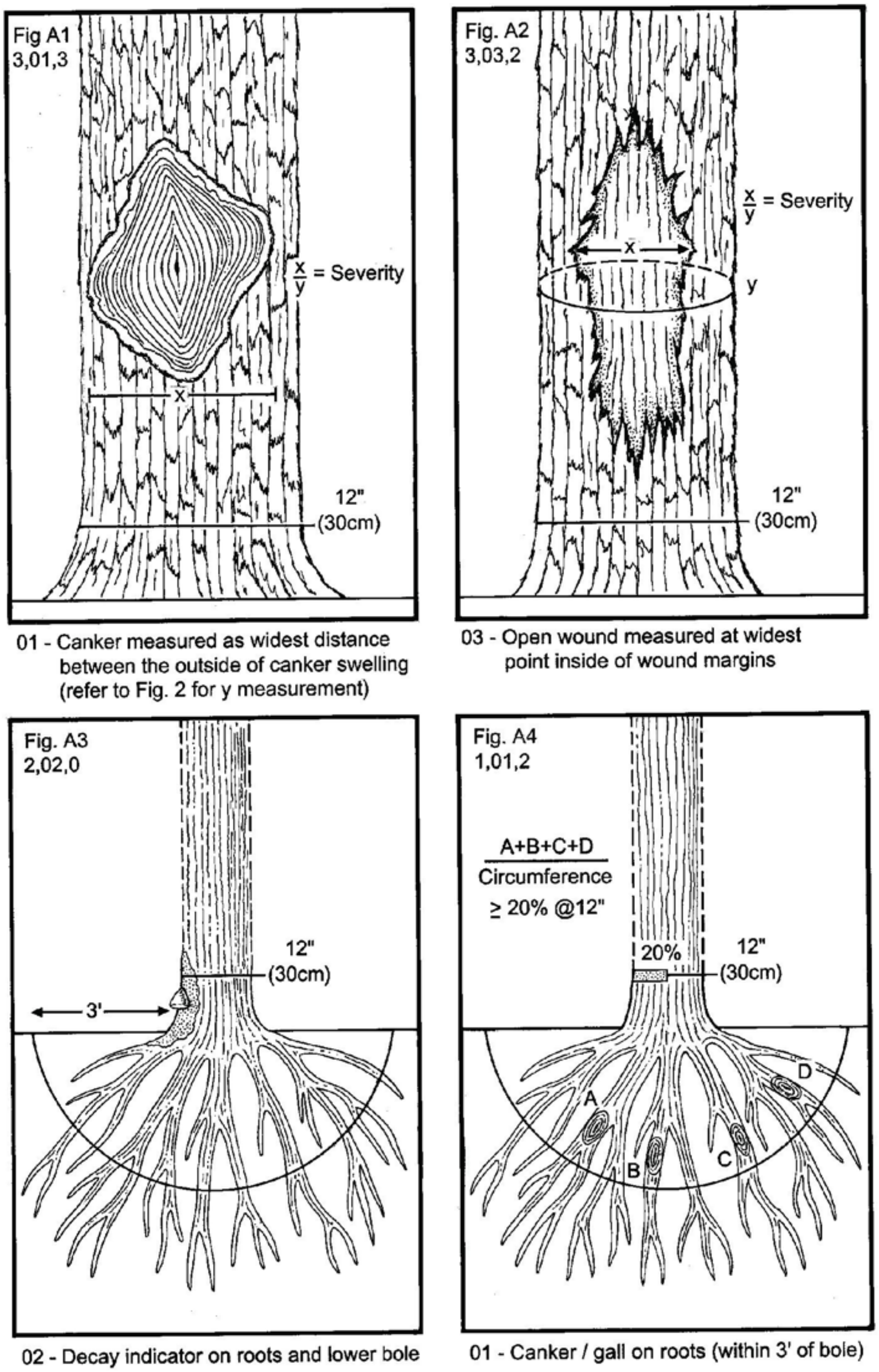
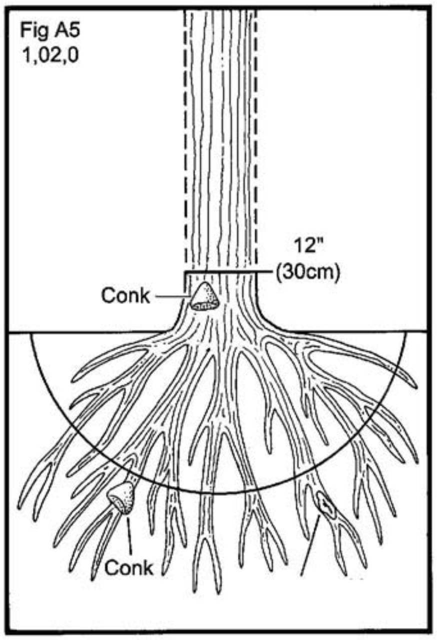
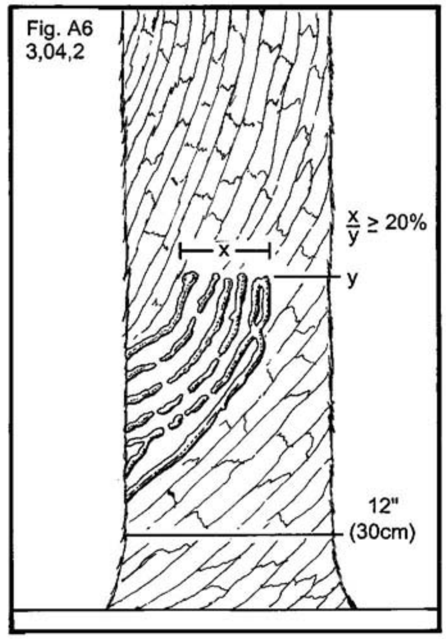


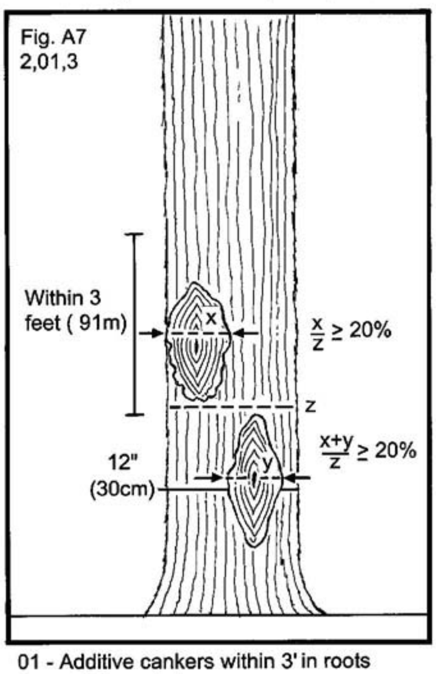
Figure 49. Examples of damage coding.



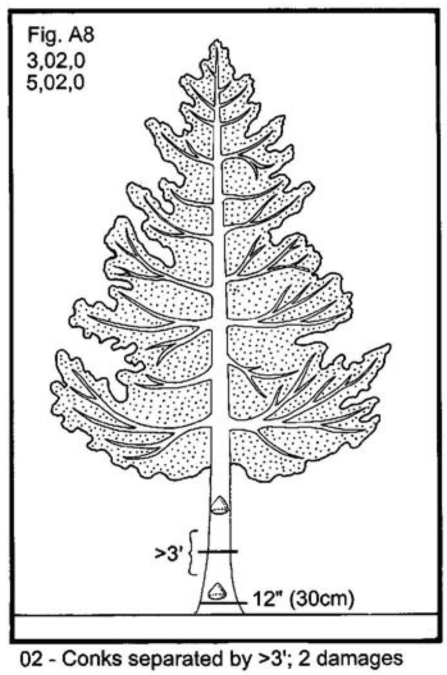
02 - Indicator of decay within 3' of bole. Beyond 3" of bole, indicators must affect ≥ 20% of roots (see fig. 12)



04 - Origin of resinosis in lower bole

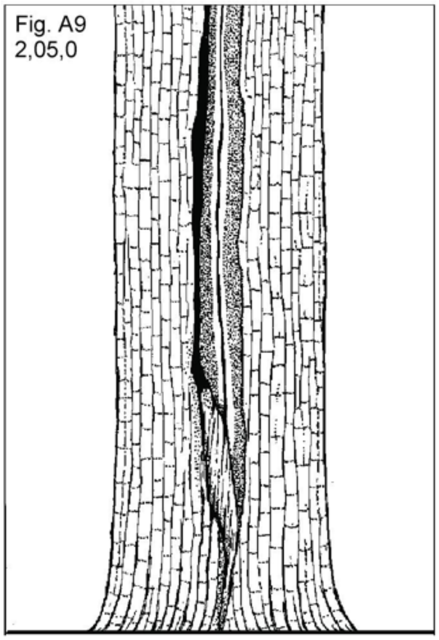


01 - Additive cankers within 3' in roots and lower bole

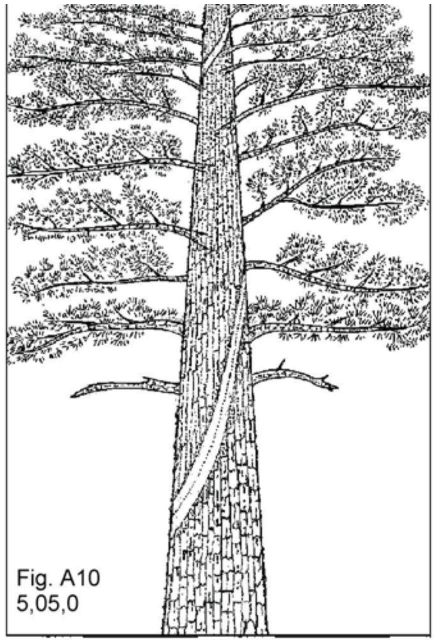


02 - Conks separated by >3'; 2 damages

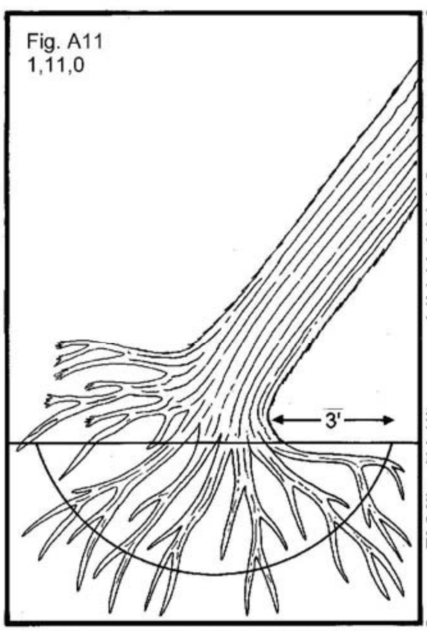
Figure 50. Examples of damage coding.



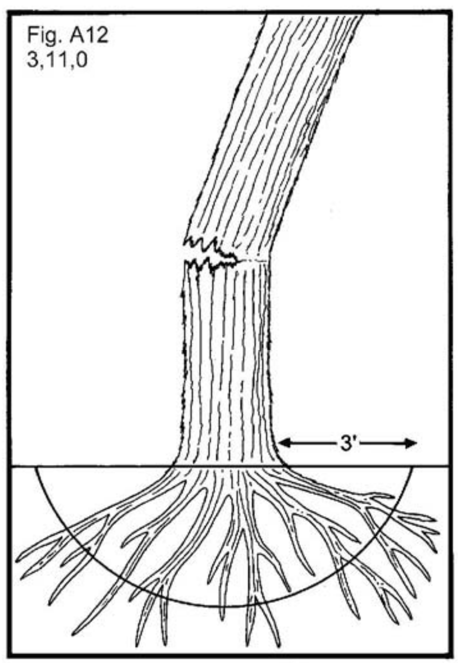
05- Cracks and seams



05 - Lightning strike

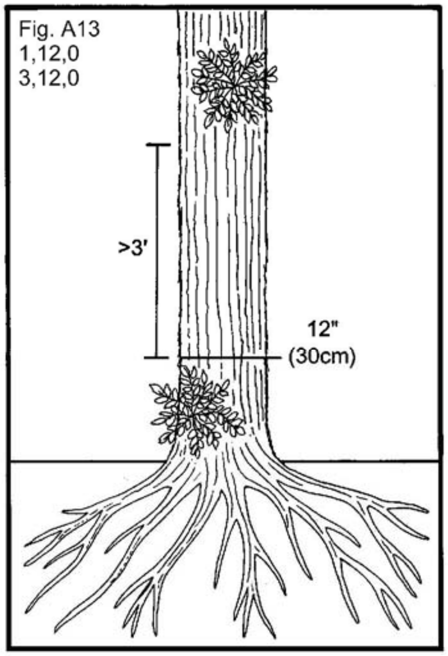


11 - Broken bole or roots <3' from bole, broken roots must be visible

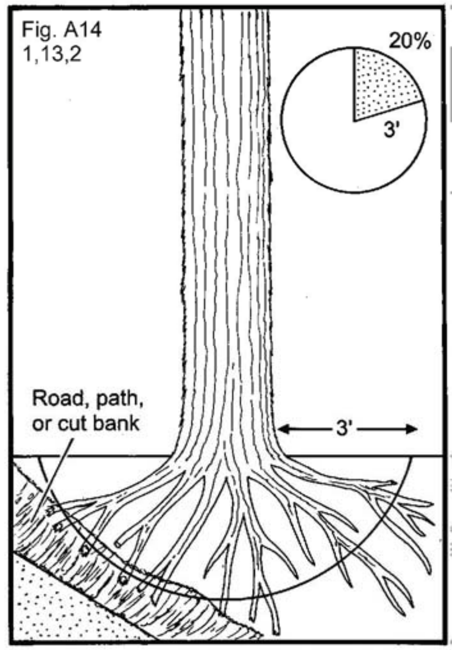


11 - Broken bole or roots <3' from bole

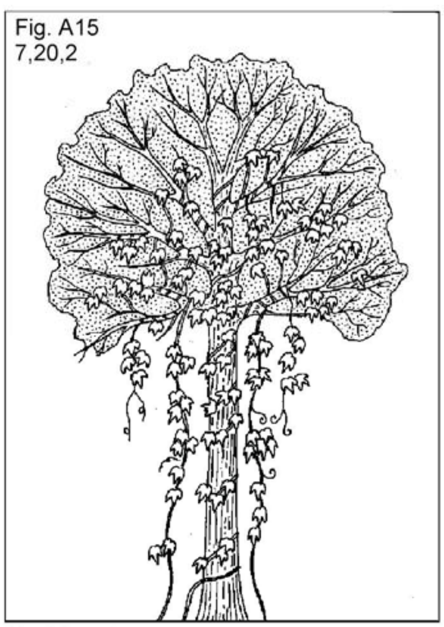
Figure 51. Examples of damage coding.



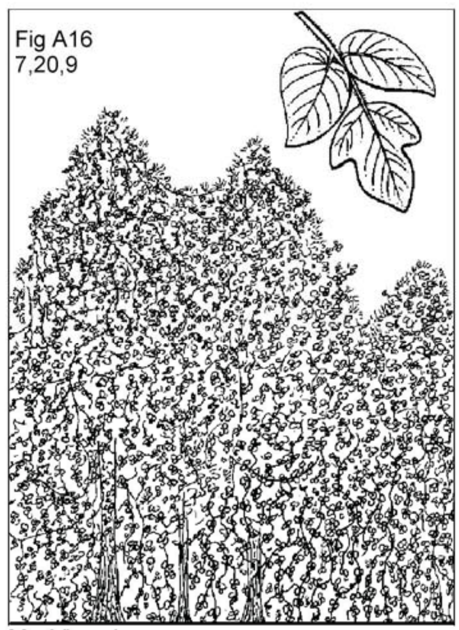
12 - Brooms on roots or bole



13 - Broken or dead roots >3' from bole



20 - Vines in crown



20 - Vines in crown

Figure 52. Examples of damage coding.

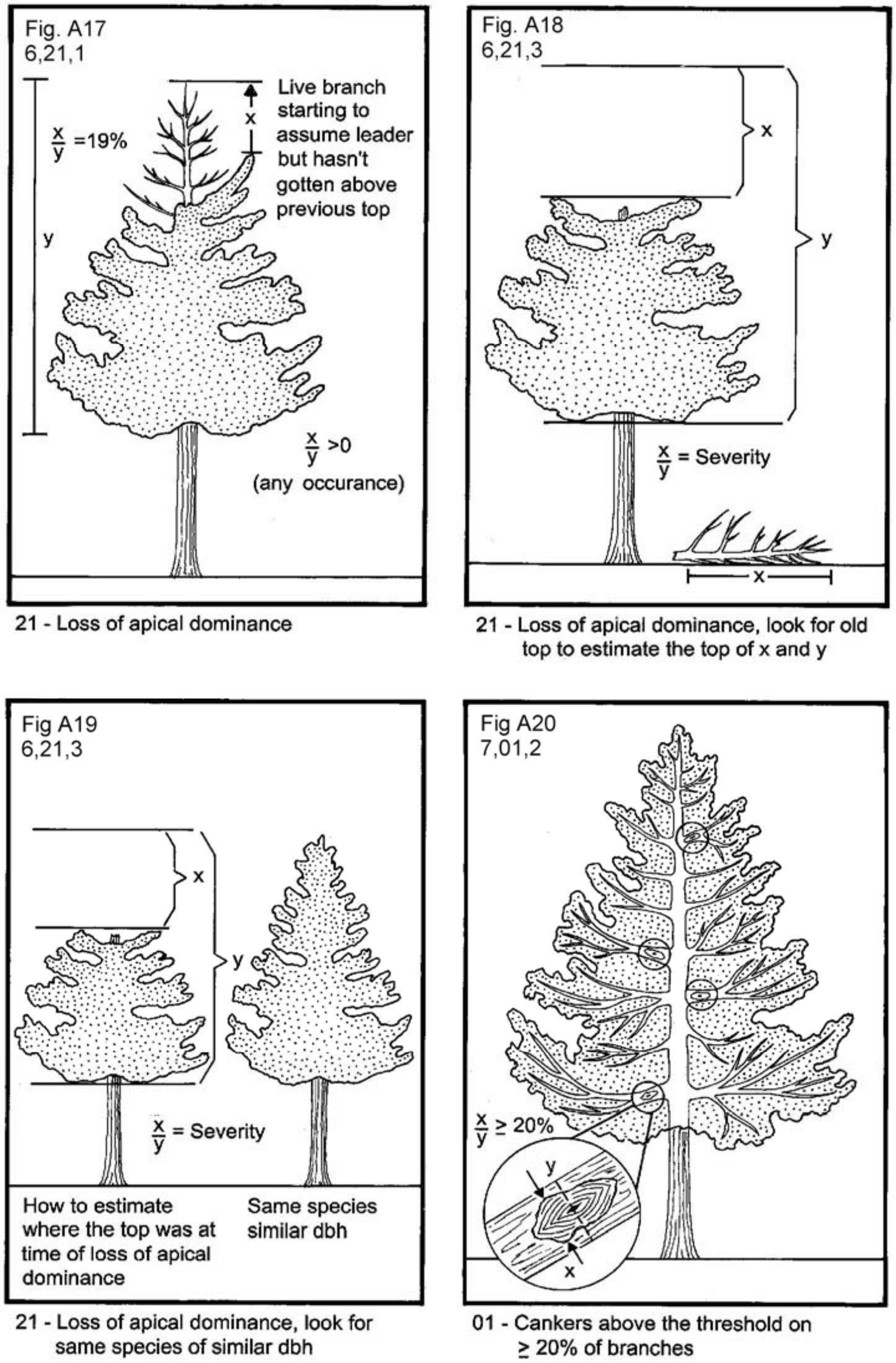
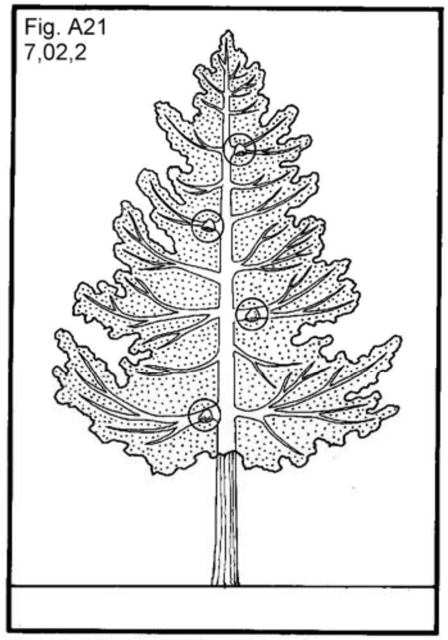
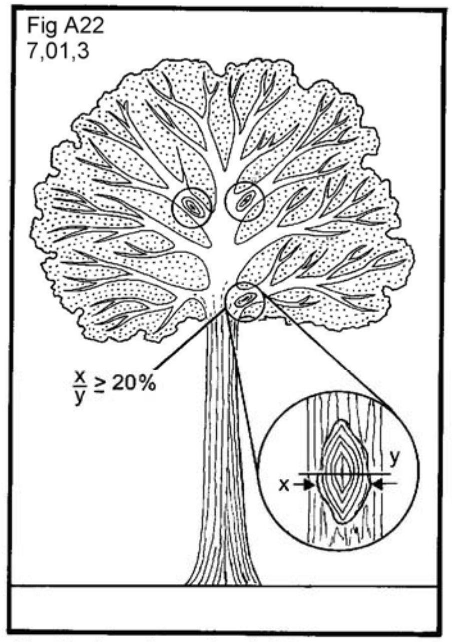


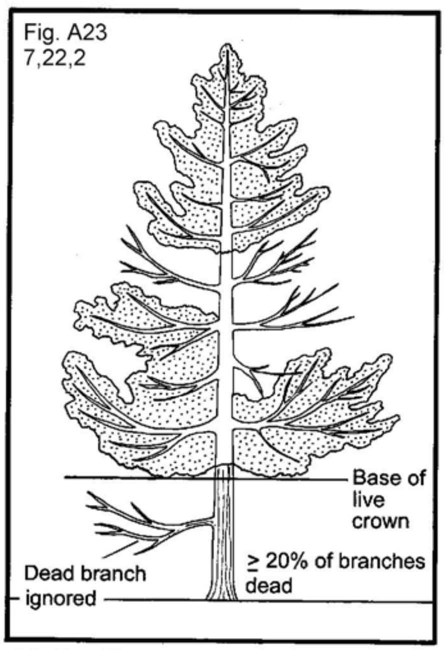
Figure 53. Examples of damage coding.



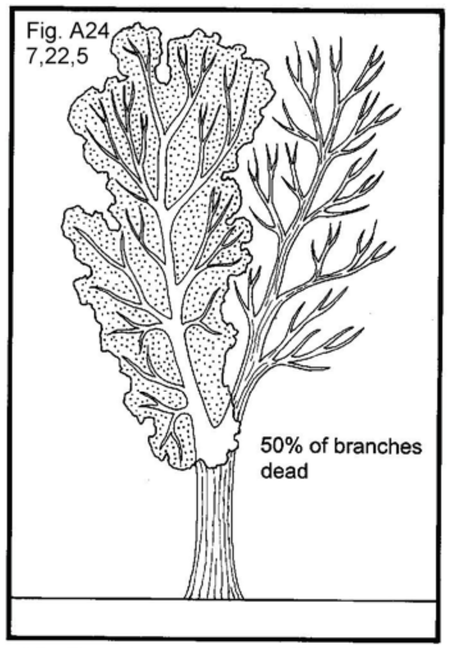
02 - Conks on $\geq$ 20% of branches



01 - Cankers above threshold on $\geq$ 20% of branches

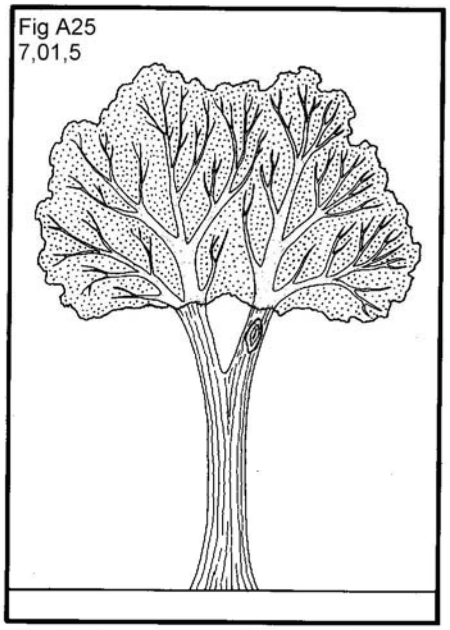


22 - Dead branches within the live crown area. If branches cannot easily be counted, estimate % area of live crown affected

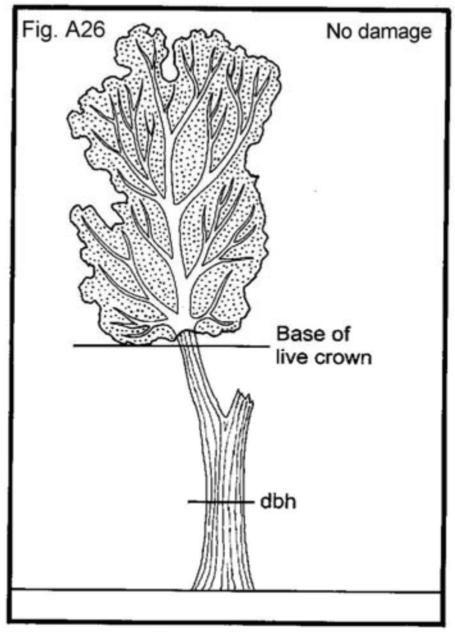


22 - Dead branches; only 2 branches present within live crown area, fines present and $\geq$20% of branch dead

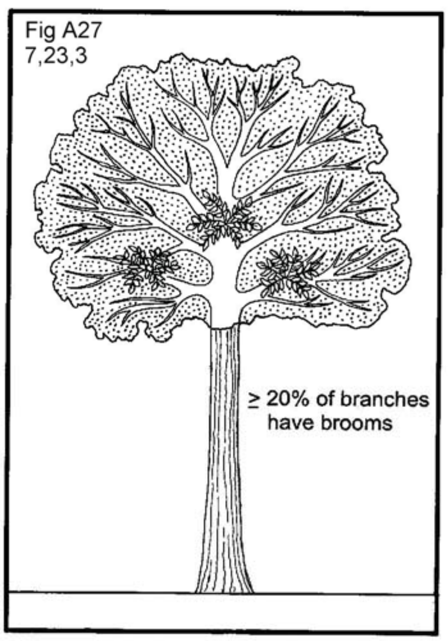
Figure 54. Examples of damage coding.



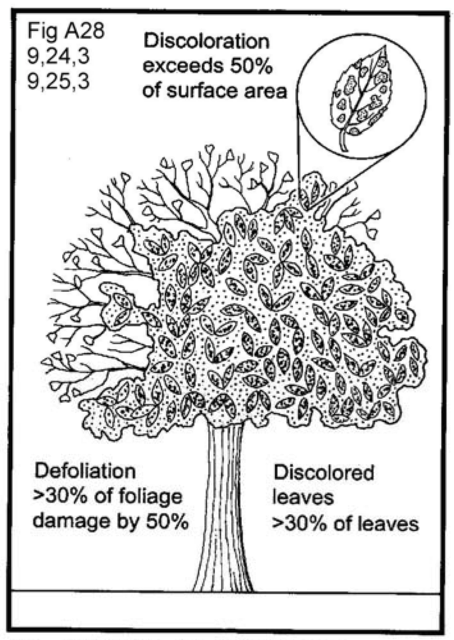
01 - Canker; no crown stem and only 2 branches present



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 55. 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 (fig. 48).

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)

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)

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)

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.

5.21 CAUSE OF DEATH

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

When Collected: CORE: SAMPLE KIND = 2 plots: all PREVIOUS TREE STATUS = 1 and PRESENT TREE STATUS = 2 or 3; or PRESENT TREE STATUS = 2 and RECONCILE = 1, 2, or 3
CORE OPTIONAL: SAMPLE KIND = 1 plots; all MORTALITY = 1
Field width: 2 digits
Tolerance: No errors
MQO: At least 80% of the time
Values:

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

5.22 MORTALITY YEAR (CORE OPTIONAL)

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

When Collected: Plots where SAMPLE KIND = 2: all PREVIOUS TREE STATUS = 1 and PRESENT TREE STATUS = 2 or 3; or PRESENT TREE STATUS = 2 and RECONCILE = 1, 2, or 3.
Field width: 4 digits
Tolerance: +/- 1 year for remeasurement cycles of 5 years
+/- 2 years for remeasurement cycles of > 5 years
MQO: At least 70% of the time
Values: 1994 or higher

5.23 DECAY CLASS

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

When Collected: All standing dead tally trees ≥ 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)

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: CORE OPTIONAL: All live and dead tally trees (except woodland species) $\geq$ 1.0 in DBH
Field width: 3 digits
Tolerance: +/- 0.2 ft
MQO: At least 90% of the time
Values: 00.1 – 15.0

5.25 ROUGH CULL (CORE OPTIONAL)

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

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

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

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

5.26 DWARF MISTLETOE CLASS (CORE OPTIONAL)

Rate all live conifer species, except juniper species, greater than or equal to 1.0 inch diameter for dwarf mistletoe (*Arceuthobium* spp.) infection. Use the Hawksworth six-class rating system: divide the live crown into thirds, and rate each third using the following scale (fig. 56):

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

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

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

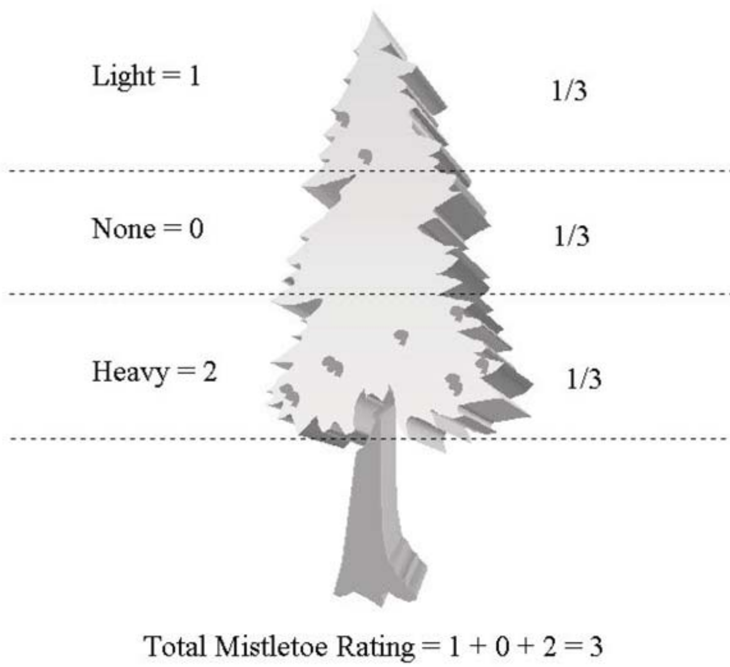


Figure 56. Example of the Hawksworth six-class rating system.

5.27 TREE NOTES

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

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

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. Hardwood seedlings must be at least 12.0 inches in length and less than 1.0 inch at DBH/DRC in order to qualify for tallying. For woodland species, each stem on a single tree must be less than 1.0 inch in DRC. Seedlings are counted in groups by species and condition class, up to five individuals per species. Counts beyond five estimated. Only count seedlings occurring in accessible forest land condition classes.

6.1 SUBPLOT NUMBER

Use the same procedures described in Section 3.1.

When Collected: All counts of seedlings

6.2 SPECIES

Use the same procedures described in Section 5.8.

When Collected: All counts of seedlings
Field width: 4 digits
Tolerance: No errors for genus, no errors for species
MQO: At least 90% of the time for genus, at least 85% of the time for species
Values: See Appendix 3

6.3 CONDITION CLASS NUMBER

Use the same procedures described in Section 2.0.

When Collected: All counts of seedlings

6.4 SEEDLING COUNT

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

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

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

When Collected: Each accessible forest land condition class on each microplot
Field width: 3 digits
Tolerance: No errors for 5 or less per species; +/- 20% over a count of 5
MQO: At least 90% of the time
Values: 001 through 999

7.0 SITE TREE INFORMATION

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

7.1 Site Tree Selection

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

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

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

7.2 Site Tree Data Variables

7.2.1 CONDITION CLASS LIST

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

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

7.2.2 SPECIES

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

When Collected: All site trees
Values: See Appendix 4

7.2.3 DIAMETER

Use the same procedures described in Section 5.9.

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

7.2.4 SITE TREE LENGTH

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

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

7.2.5 TREE AGE AT DIAMETER

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

When Collected: All site trees
Field width: 3 digits
Tolerance: +/- 5 years
MQO: At least 95% of the time
Values: 001 to 999

7.2.6 SITE TREE NOTES

Record notes pertaining to an individual site tree.

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

7.2.7 SUBPLOT NUMBER (CORE OPTIONAL)

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

When Collected: All site trees
Field width: 1 digit

Tolerance: No errors
MQO: At least 99% of the time
Values:

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

7.2.8 AZIMUTH (CORE OPTIONAL)

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

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

7.2.9 HORIZONTAL DISTANCE (CORE OPTIONAL)

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

When Collected: All site trees
Field width: 4 digits (xxx.y)
Tolerance: +/- 5 ft
MQO: At least 90% of the time
Values: 0001 to 2000

8.0 PHASE 2 (P2) VEGETATION PROFILE (CORE OPTIONAL)

The Phase 2 (P2) vegetation data are collected to provide vegetation structure and dominant species composition for vascular plants. The data collected provide a horizontal and vertical estimation of vegetation located within the sample area and provide information for the most abundant species found on the subplot. Information on the abundance, structure, and species composition of understory plant communities has many uses. It can be used to assess wildlife habitat, biomass, forage availability, grazing potential, vegetation competition with tree growth, fuel loadings from understory vegetation, and potential site productivity. The most abundant species provide information to classify plant community types into plant associations and to predict associated forest stand characteristics. Accurately representing the species present on a site and their change in abundance in response to forest development, disturbance, or management is therefore important to a wide variety of users. This information is also used to augment forest ecosystem health assessments from P3 plots, in terms of vegetation structure and rates of change of community vascular plant composition.

The P2 Vegetation protocols are core-optional. Each FIA unit determines whether to collect the P2 vegetation information and several levels of options must be determined by each unit prior to data collection. Options declared prior to field data collections include Vegetation sampling status and level of detail. Vegetation sampling status determines if P2 vegetation is to be collected, and, if so, what lands are included; the unit may choose to collect only on forested conditions or on all accessible conditions found on the plot. The level of detail determines if data are collected on structure by growth habit only; or if the most abundant species are recorded; and whether trees greater than or equal to 5 inches DBH (DRC for woodland species) are included in species records. FIA units collecting species data record information on (up to) the four most dominant species per growth habit that have a cover of at least 3 percent on the subplot. Most trees greater than or equal to 5 inches DBH/DRC are already measured during tree tally, but some units may choose to also record visual estimates of cover for them. Regardless of the level of detail, the protocols found in this section will be implemented in such a way that basic structure and species data can be compared across the nation.

8.1 Vegetation Sampling Design

The core optional Phase 2 Vegetation Profile includes measurements of vegetation structure – cover by layer and total aerial cover of each growth habit – with additional options to collect data on the most abundant species in each growth habit.

Sampling of vegetation is focused on accessible condition classes within the 24.0-foot radius subplot. Inventory units implementing the vegetation profile determine if they will include accessible forested lands, or any accessible land (P2 Vegetation Sampling Status). If the area of an accessible condition class is less than 100 percent on a subplot, vegetation measurements are done only on the portion that accessible. If multiple accessible condition classes are present on the subplot, separate estimates are made for each condition class area on the subplot. Prior to implementation, inventory units must also determine the LEVEL of DETAIL they will collect, so that regional field guides and PDR programs can be customized to ensure quality data is collected in the most efficient manner possible. All units implementing Vegetation Profile will collect Level of Detail = 1, vegetation structure as cover by growth habit by layer and total aerial cover. Level of Detail = 2 and 3 include species composition data.

Vegetation is best recorded when all plant species are fully leafed out. However, crews may end up visiting plots early in the season before leaves are fully expanded or late in the season when plants are beginning to senesce.Canopy cover is vertically projected from the outline of the foliage as they see it **at the time of plot visit.** Notes can be added to subplot records indicating unusual phenological conditions. Crews should not collect vegetation data in leaf off condition or when snow covers the plot (see 8.4.2 P2 VEG SUBPLOT SAMPLE STATUS).

8.2 General definitions

Canopy Cover – Canopy cover is defined as the area of ground surface covered by a vertical projection of the canopy of a vascular plant. The canopy is described by a polygon surrounding the outer edges of the foliage (fig. 57), without subtracting any normal spaces occurring between the leaves of plants (Daubenmire 1959[1]). Overlapping crowns within a species or growth habit are not double-counted; the maximum possible cover is 100 percent. All estimates on the cover of vegetation are focused on plants or plant parts that are located within the sampled condition class within the subplot perimeter (24.0-foot radius, horizontal distance) and any foliar parts overhanging the sampled condition class within the subplot. Canopy cover is collected by height layer or as a total (aerial view) cover across all layers for all growth habits in *Vegetation Structure* (8.5). Total aerial cover is collected for recorded species in *Species Composition* (8.6)**.** Cover is estimated to the nearest 1 percent. See tabulation below for cover to area relationships for a 1/24 acre subplot and figures 55 and 56 for additional visual calibrations. Group practice in the field is a mandatory training exercise.

Cover	Area (ft^2)	Square length on side (ft)	Circle radius (ft)
1%	18	4.3	2.4
3%	54	7.4	4.2
5%	90	9.5	5.4
10%	181	13.4	7.6
15%	271	16.5	9.3
20%	362	19.0	10.7
25%	452	21.3	12.0
50%	905	30.1	17.0

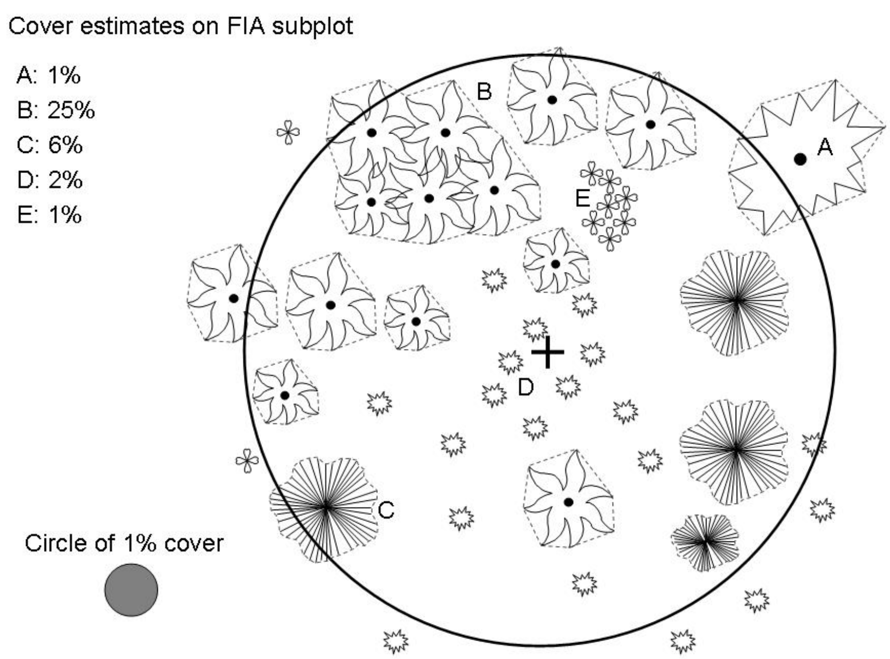


Figure 57. Assessing canopy cover. See individual variable text for more detail.

[1] Daubenmire. R. 1959. A canopy-coverage method of vegetational analysis. Northwest Science 33(1): 43-64.

Growth Habits – P2 Vegetation data is collected by growth habits at each level of detail. In general, growth habits for vascular plants include trees, shrubs and woody vines, forbs, and grass-like plants (graminoids). However, depending on the level of detail, **trees** are grouped in different ways. See sections 8.5 and 8.6 for more detail.

Layer Codes – Growth Habit groups are assessed by layers in *Vegetation Structure* (8.5), and one of the following layer codes (section 8.65) will be assigned to individual plant species in *Species Composition* (8.6).

NRCS PLANTS database – The Natural Resource Conservation Service (NRCS) PLANTS Database provides standardized information about the vascular plants, mosses, liverworts, hornworts, and lichens of the U.S. and its territories. It includes names, plant symbols, checklists, distributional data, species abstracts, characteristics, images, crop information, automated tools, onward Web links, and references:

USDA, NRCS. 2010. The PLANTS Database (http://plants.usda.gov, 1 January 2010). National Plant Data Center, Baton Rouge, LA 70874-4490 USA.

FIA currently uses a stable codeset downloaded in January of 2010.

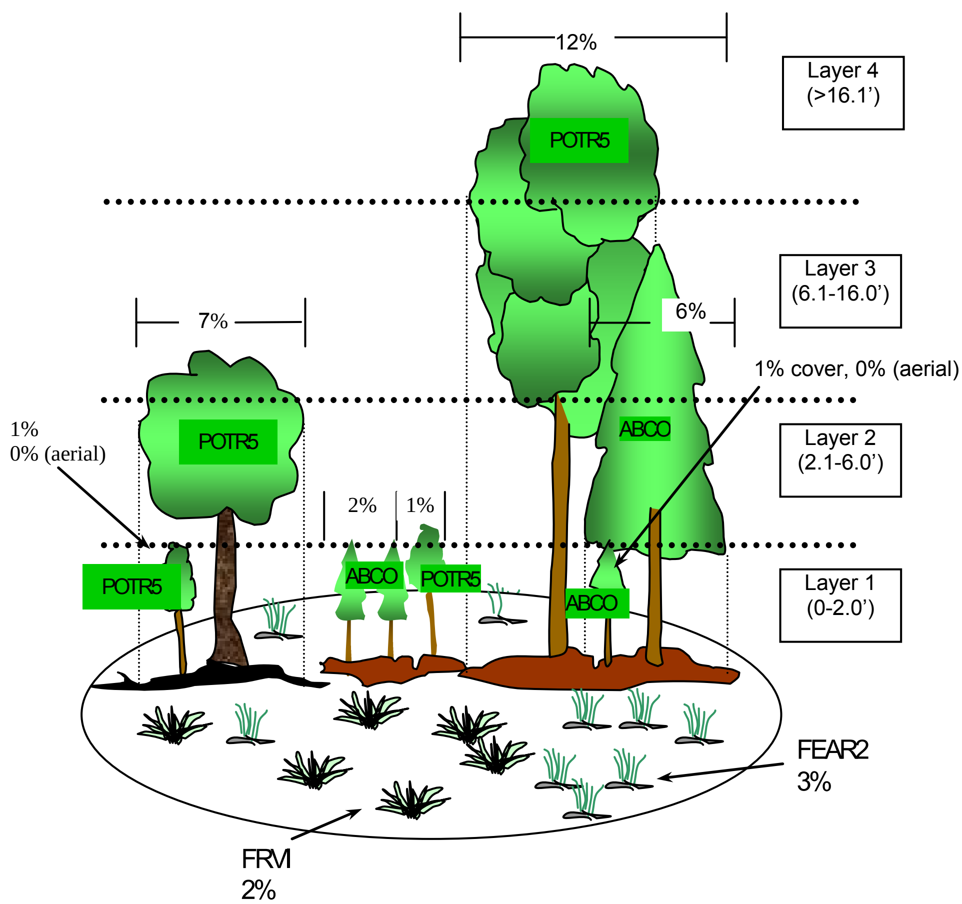


Figure 58. Example of growth habit by layer and species composition.

Table 1-Estimation of canopy cover by layer and aerial view of each growth habit in figure 58

Vegetation Structure Growth Habit	Layer 1 (0-2.0')	Layer 2 (2.1'-6.0')	Layer 3 (6.1'-16.0')	Layer 4 (>16.1')	Aerial
			Percent canopy cover		
Tally tree sp (TT)	005	013	019	08	022
Non-tally tree sp (NT)	000	000	000	000	000
Shrub & Vine (SH)	000	000	000	000	000
Forb (FB)	002	000	000	000	002
Graminoid (GR)	003	000	000	000	003

Table 2-Estimation of canopy cover by species in figure 58

Level of Detail	Species Growth Habit	Species Code	Cover	Layer
2	GR	FEAR2	003	1
2	SD	ABCO	003	1
2	SD	POTR5	008	3
3	LT	POTR5	008	4
3	LT	ABCO	006	3

Note: FRVI, estimated at 2%, was not recorded, and ABCO and POTR5 are present as two different growth habits (seedling/sapling and large tree) with at least 3% cover.

8.3 Vegetation Sampling Options – Plot-Level Variables

The following options are set by the inventory unit prior to field season and are not set by field crews upon arriving at a plot. Therefore, each unit can customize the PDR program to automatically fill these variables. These variables are included to aid data management and allow various units to be compared appropriately.

8.3.1 P2 VEGETATION SAMPLING STATUS

This plot-level variable determines whether vegetation data will be recorded on the plot and the land class(es) on which it will be recorded. The code used will be determined by regional needs. If P2 VEGETATION SAMPLING STATUS = 0, no further data collection is required within this field guide section.

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

0 Not sampling vegetation
1 Vegetation data collected only on accessible forest land conditions (CONDITION CLASS STATUS = 1 and NONFOREST SAMPLING STATUS = 0)
2 Vegetation data collected on all accessible land conditions (CONDITION CLASS STATUS=1 or 2, NONFOREST SAMPLING STATUS =1 and NONFOREST PLOT STATUS=1)

8.3.2 LEVEL OF DETAIL

This plot-level variable determines whether data are collected for vegetation structure growth habits only or for individual species (that qualify as most abundant) as well. If LEVEL OF DETAIL = 3, then a tree species could be recorded twice, but it would have two different species growth habits (see 8.6.1).

When collected: on all plots where P2 vegetation is being sampled (P2 VEGETATION SAMPLING STATUS = 1 or 2)
Field width: 1 digit
MQO: No errors
Tolerances: At least 99% of the time
Values:

1 Collect data for vegetation structure only; total aerial cover and cover by layer for tally tree species (all sizes), non-tally tree species (all sizes), shrubs, forbs, and graminoids.
2 Collect vegetation structure data (Level of Detail = 1) **plus** understory species composition data including up to four species of: seedlings and saplings of any tree species (tally or non-tally) <5 inches DBH (DRC for woodland species), shrubs (including woody vines), forbs, and grasses.
3 Collect vegetation structure data, understory species composition data (Level of Detail = 2), **plus** up to four trees species (tally or non-tally) ≥5 inches DBH (DRC for woodland species)

8.4 Vegetation Data Collection Location – Subplot-Level Variables

8.4.1 SUBPLOT NUMBER

Record the code corresponding to the number of the subplot.

When collected: On all plots where P2 vegetation is being sampled (P2 VEGETATION SAMPLING STATUS = 1 or 2)
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

8.4.2 P2 VEG SUBPLOT SAMPLE STATUS

Record the code to indicate if the subplot was sampled for P2 vegetation. A condition may be sampled but not have any vascular plants present. If **all** the vegetation measurements cannot be completed on the subplot (for example, deep snow or water, hazardous weather, time limitation), enter code 2 and do not record **any** vegetation measurements.

When collected: On all subplots where P2 vegetation is being sampled on accessible forest land (P2 VEGETATION SAMPLING STATUS=1 and SUBPLOT STATUS = 1) or is being sampled on accessible forest land or nonforest land and at least one accessible nonforest land condition is present on the plot (P2 VEGETATION SAMPLING STATUS=2 and NONFOREST SUBPLOT STATUS=1)

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

1 Subplot sampled
2 Subplot not sampled

8.4.3 VEGETATION NONSAMPLED REASON
Record the reason why vegetation on a subplot cannot be sampled.

When collected: On all subplots where P2 vegetation is being sampled on all accessible land conditions (P2 VEG SUBPLOT SAMPLE STATUS = 2)
Field width: 2 digits
Tolerance: No errors
MQO: At least 99% of the time
Values:

04 Time limitation
05 Lost data (for office use only)
10 Other (for example, snow or water covering vegetation that is supposed to be sampled)

8.4.4 CONDITION CLASS NUMBER
Record the number for the sampled condition class in which the vegetation is found. If multiple sampled conditions occur on the same subplot, data will be collected for each condition separately.

When collected: Any accessible condition class when P2 vegetation is being sampled on accessible forest land conditions (P2 VEGETATION SAMPLING STATUS =1)
Field width: 1 digit
Tolerance: No errors
MQO: At least 99% of the time
Values: 1 to 9

8.4.5 VEGETATION SUBPLOT NOTES
Use this field to record notes pertaining to the subplot, and any unusual conditions encountered.

When collected: VEGETATION NONSAMPLED REASON = 10 or as needed
Field width: 2000 alphanumeric characters
Tolerance: N/A
MQO: N/A
Values: English language words, phrases, and numbers

8.5 Vegetation Structure

In this section, use ocular methods to estimate canopy cover by layer and aerial view coverage for each growth habit, and record to the nearest percent.

Canopy cover by layer:
Estimate the canopy cover for each of the four layers. Include growth habits present on the condition and any foliar parts overhanging the condition. For each layer cover, examine the canopy cover of each

growth habit as if the other growth habits do not exist. Do not double count overlapping layers within a growth habit; visualize the cover layer collapsed into a 2-dimensional space. If a growth habit group does not have foliage in a layer, enter 0 (do not count tree boles as cover).

Aerial View Coverage:
Determine the total canopy cover by growth habit (trees, shrubs, forbs, and graminoids). Examine each growth habit individually as if the other growth habits do not exist. Do not double count overlapping layers within a growth habit (maximum cover=100%). To determine, estimate the area of ground surface covered by a vertically-projected polygon, described by the outline of the foliage, ignoring any normal spaces occurring between the leaves of plants (Daubenmire 1959) for the particular growth habit (fig.57).

Cover is estimated for each sampled condition of the subplot. If multiple sampled conditions occur on a subplot, treat the condition boundary as a vertical wall on the plot: **plant foliage is included in the condition it is hanging over**, even if the plant is rooted in a different condition. However, the foliage **cover value is always estimated as a percent of an entire subplot**. That is, if the cover of a growth habit within the condition is about equal to a circle with a radius of 5.3 feet, the cover estimate will always be 5 percent, even if only 30 percent of the subplot is in the condition on which the species is being measured.

The total cover for a specific growth habit must be equal to or greater than the highest cover recorded for an individual layer in that growth habit, but cannot be greater than the sum of the covers recorded for all the layers in that growth habit.

Vegetation Structure Growth Habits:
Apply the definitions that follow based on the species and appearance of the plants **on the subplot-condition** (i.e. do not put the same species in multiple growth habits on the same subplot-condition). If a tree species has been selected as a tally tree by the particular FIA unit, always record that species in the tally tree species growth habit (TT), even if it grows as a shrub in some environments. Woody plants **not** on the unit's tally tree list may have a tree growth habit in some environments, and these should be recorded as non-tally tree species (NT). If the growth habit is shrub in another environment, record that species as a shrub (SH). The definitions (adapted from NRCS PLANTS) are:

TT **Tally Tree Species (TT):** All core tree species **and** any core-optional tree species selected by a particular FIA unit. Any plant of that species is included, regardless of its shape and regardless of whether it was tallied on the subplot or microplot during tree tally (plants with canopy hanging into the subplot). Seedlings, saplings, and mature plants are included.

NT **Non-tally Tree Species (NT):** Tree species not on a particular FIA unit's tree tally list that are woody plants with a single stem, not supported by other vegetation or structures (not vines), and which are, or are expected to become, greater than 13 feet in height. Seedlings, saplings, and mature plants are included.

SH **Shrubs:/Woody Vines (SH):** Woody, multiple-stemmed plants of any size, and vines. Most cacti are included in this category.

FB **Forbs (FB):** Herbaceous, broad-leaved plants; includes non-woody-vines, ferns (does not include mosses and cryptobiotic crusts).

GR **Graminoids (GR):** Grasses and grass-like plants (includes rushes and sedges).

8.5.1 TALLY TREE SPECIES COVER LAYER 1

Record a total canopy coverage for all tally tree species in layer 1 (0-2.0 feet) to the nearest percent. Cover includes all tally tree species present, regardless of DBH or DRC.

When Collected: On all conditions within subplots where (P2 VEGETATION SAMPLING STATUS=1 and CONDITION CLASS STATUS = 1) or (P2 VEGETATION SAMPLING STATUS=2 and NONFOREST CONDITION STATUS=2)
Field Width: 3 digits
Tolerance: +/- 1 class based on the following canopy cover classes: 1%, 2-5%, 6-10%, 11-25%, 26-50%, 51-75%, 76-95%, 96-100%
MQO: at least 90% of the time
Values: 000-100

8.5.2 TALLY TREE SPECIES COVER LAYER 2

Record a total canopy coverage for all tally tree species in layer 2 (2.1- 6.0 feet) to the nearest percent. Cover includes all tally tree species present, regardless of DBH or DRC. Follow the same procedures as for TALLY TREE SPECIES COVER LAYER 1.

8.5.3 TALLY TREE SPECIES COVER LAYER 3

Record a total canopy cover for all tally tree species in layer 3 (6.1- 16.0 feet) to the nearest percent. Cover includes all tally tree species present, regardless of DBH or DRC. Follow the same procedures as for TALLY TREE SPECIES COVER LAYER 1.

8.5.4 TALLY TREE SPECIES COVER LAYER 4

Record a total canopy cover for all tally tree species in layer 4 (16.1 feet and above) to the nearest percent. Cover includes all tally tree species present, regardless of DBH or DRC. Follow the same procedures as for TALLY TREE SPECIES COVER LAYER 1.

8.5.5 TALLY TREE SPECIES COVER – AERIAL VIEW

Record the total canopy cover for all tally tree species over all layers. Cover includes all tally tree species present, regardless of DBH or DRC. Follow the same procedures as for TALLY TREE SPECIES COVER LAYER 1, but include all layers.

8.5.6 NON-TALLY TREE SPECIES COVER LAYER 1

Record a total canopy coverage for species **not** on the tally tree species list with tree growth habit in layer 1 (0-2.0 feet) to the nearest percent. Cover includes all non-tally tree species present, regardless of DBH or DRC.

When Collected: On all conditions within subplots where (P2 VEGETATION SAMPLING STATUS=1 and CONDITION CLASS STATUS = 1) or (P2 VEGETATION SAMPLING STATUS=2 and NONFOREST CONDITION STATUS=2)
Field Width: 3 digits
Tolerance: +/- 1 class based on the following canopy cover classes: 1%, 2-5%, 6-10%, 11-25%, 26-50%, 51-75%, 76-95%, 96-100%
MQO: at least 90% of the time
Values: 000-100

8.5.7 NON-TALLY TREE SPECIES COVER LAYER 2

Record a total canopy coverage for species **not** on the tally tree species list with tree growth form in layer 2 (2.1- 6.0 feet) to the nearest percent. Cover includes all non-tally tree species present, regardless of DBH or DRC. Follow the same procedures as for NON-TALLY TREE SPECIES COVER LAYER 1.

When collected: On all conditions within subplots where (P2 VEGETATION SAMPLING STATUS=1 and CONDITION CLASS STATUS = 1) or (P2 VEGETATION SAMPLING STATUS=2 and NONFOREST CONDITION STATUS=2)
Field width: 3 digits
Tolerance: +/- 1 class based on the following canopy cover classes: 1%, 2-5%, 6-10%, 11-25%, 26-50%, 51-75%, 76-95%, 96-100%
MQO: at least 90% of the time
Values: 000-100

8.5.8 NON-TALLY TREE SPECIES COVER LAYER 3

Record a total canopy cover for species **not** on the tally tree species list with tree growth form in layer 3 (6.1- 16.0 feet) to the nearest percent. Cover includes all non-tally tree species present, regardless of DBH or DRC. Follow the same procedures as for NON-TALLY TREE SPECIES COVER LAYER 1.

8.5.9 NON-TALLY TREE SPECIES COVER LAYER 4

Record a total canopy cover for species **not** on the tally tree species list with tree growth habit in layer 4 (16.1 feet and above) to the nearest percent. Cover includes all non-tally tree species present, regardless of DBH or DRC. Follow the same procedures as for NON-TALLY TREE SPECIES COVER LAYER 1.

8.5.10 NON-TALLY TREE SPECIES COVER – AERIAL VIEW

Record the total canopy cover for species **not** on the tally tree species list with tree growth habit over all layers. Cover includes all non-tally tree species present, regardless of DBH or DRC. Follow the same procedures as for NON-TALLY TREE SPECIES COVER LAYER 1.

8.5.11 SHRUB AND WOODY VINE COVER LAYER 1

Record a total canopy coverage for shrubs in layer 1 (0-2.0 feet) to the nearest percent.

When collected: On all conditions within subplots where (P2 VEGETATION SAMPLING STATUS=1 and CONDITION CLASS STATUS = 1) or (P2 VEGETATION SAMPLING STATUS=2 and NONFOREST CONDITION STATUS=2)
Field width: 3 digits
Tolerance: +/- 1 class based on the following canopy cover classes: 1%, 2-5%, 6-10%, 11-25%, 26-50%, 51-75%, 76-95%, 96-100%
MQO: at least 90% of the time
Values: 000-100

8.5.12 SHRUB AND WOODY VINE COVER LAYER 2

Record a total canopy coverage for shrubs in layer 2 (2.1-6.0 feet) to the nearest percent. Follow the same procedures as for SHRUB AND WOODY VINE COVER LAYER 1.

8.5.13 SHRUB AND WOODY VINE COVER LAYER 3

Record a total canopy coverage for shrubs in layer 3 (6.1-16.0 feet) to the nearest percent. Follow the same procedures as for SHRUB AND WOODY VINE COVER LAYER 1.

8.5.14 SHRUB AND WOODY VINE COVER LAYER 4

Record a total canopy coverage for shrubs in layer 4 (16.1 feet and above) to the nearest percent. Follow the same procedures as for SHRUB AND WOODY VINE COVER LAYER 1.

8.5.15 SHRUB AND WOODY VINE COVER—AERIAL VIEW
Record the total canopy cover for the shrub/ woody vine growth habit over all layers. Follow the same procedures as for SHRUB AND WOODY VINE COVER LAYER 1, but include all layers.

8.5.16 FORB COVER LAYER 1
Record a total canopy coverage for forbs in layer 1 (0-2.0 feet) to the nearest percent.

When collected: On all conditions within subplots where (P2 VEGETATION SAMPLING STATUS=1 and CONDITION CLASS STATUS = 1) or (P2 VEGETATION SAMPLING STATUS=2 and NONFOREST CONDITION STATUS=2)
Field width: 3 digits
Tolerance: +/- 1 class based on the following canopy cover classes: 1%, 2-5%, 6-10%, 11-25%, 26-50%, 51-75%, 76-95%, 96-100%
MQO: at least 90% of the time
Values: 000-100

8.5.17 FORB COVER LAYER 2
Record a total canopy coverage for forbs in layer 2 (2.1-6.0 feet) to the nearest percent. Follow the same procedures as for FORB COVER LAYER 1.

8.5.18 FORB COVER LAYER 3
Record a total canopy coverage for forbs in layer 3 (6.1-16.0 feet) to the nearest percent. Follow the same procedures as for FORB COVER LAYER 1.

8.5.19 FORB COVER LAYER 4
Record a total canopy coverage for forbs in layer 4 (16.1 feet and above) to the nearest percent. Follow the same procedures as for FORB COVER LAYER 1.

8.5.20 FORB COVER—AERIAL VIEW
Record the total canopy cover for the forb growth habit over all layers. Follow the same procedures as for FORB COVER LAYER 1.

8.5.21 GRAMINOID COVER LAYER 1
Record a total canopy coverage for graminoids in layer 1 (0-2.0 feet) to the nearest percent.

When collected: On all conditions within subplots where (P2 VEGETATION SAMPLING STATUS=1 and CONDITION CLASS STATUS = 1) or (P2 VEGETATION SAMPLING STATUS=2 and NONFOREST CONDITION STATUS=2)
Field width: 3 digits
Tolerance: +/- 1 class based on the following canopy cover classes: 1%, 2-5%, 6-10%, 11-25%, 26-50%, 51-75%, 76-95%, 96-100%
MQO: at least 90% of the time
Values: 000-100

8.5.22 GRAMINOID COVER LAYER 2
Record a total canopy coverage for graminoids in layer 2 (2.1-6.0 feet) to the nearest percent. Follow the same procedures as for GRAMINOID COVER LAYER 1.

8.5.23 GRAMINOID COVER LAYER 3

Record a total canopy coverage for graminoids in layer 3 (6.1-16.0 feet) to the nearest percent. Follow the same procedures as for GRAMINOID COVER LAYER 1.

8.5.24 GRAMINOID COVER LAYER 4

Record a total canopy coverage for graminoids in layer 4 (16.1 feet and above) to the nearest percent. Follow the same procedures as for GRAMINOID COVER LAYER 1.

8.5.25 GRAMINOID COVER—AERIAL VIEW

Record the total canopy cover for the graminoid growth habit over all layers. Follow the same procedures as for GRAMINOID COVER LAYER 1.

8.6 Species Composition

Species are recorded when LEVEL OF DETAIL = 2 or 3. Identify the four most abundant species within each growth habit group (tree seedlings and saplings, shrubs/woody vines, forbs, graminoids, and overstory trees) that occupy 3 percent or greater canopy cover on the subplot. Although up to four species with cover of at least 3 percent per growth habit can be recorded, crews should not spend more than 5 minutes searching for additional species when less than four species are not readily observable. The methods described assume that only one field crew member per plot is entering vegetation profile data. Other crew members may assist with assessments, but data entry by only one person is highly recommended.

When there are multiple conditions within a subplot, the species must be present at 3 percent or more cover on the full 24-foot radius subplot in order to be recorded. If part of the subplot is a non-sampled condition (e.g., nonforest or inaccessible), estimate cover for the full subplot if possible; otherwise assume the species density is the same on the non-sampled portion. If a species is present at 3 percent cover or more on the full subplot, record species and cover separately for each condition, by only including cover within a vertical projection of the condition boundary within a subplot. Cover percentages are always fixed on the full subplot area, regardless of condition proportion. For example, on a subplot with two sampled conditions, a species occurs with a cover equal to a circle with a radius of 7.6 feet on the full subplot, or 10 percent cover, so it is recorded. On condition class #1, it covers an area equal to a circle of 2.4-foot radius and is recorded as 1 percent cover. The remainder, 9 percent cover, is recorded for condition #2. Cover values less than 3 percent for a condition that occupies part of a subplot are valid as long as the cover of the species on the full subplot is at least 3 percent. See figure 59 for an example.

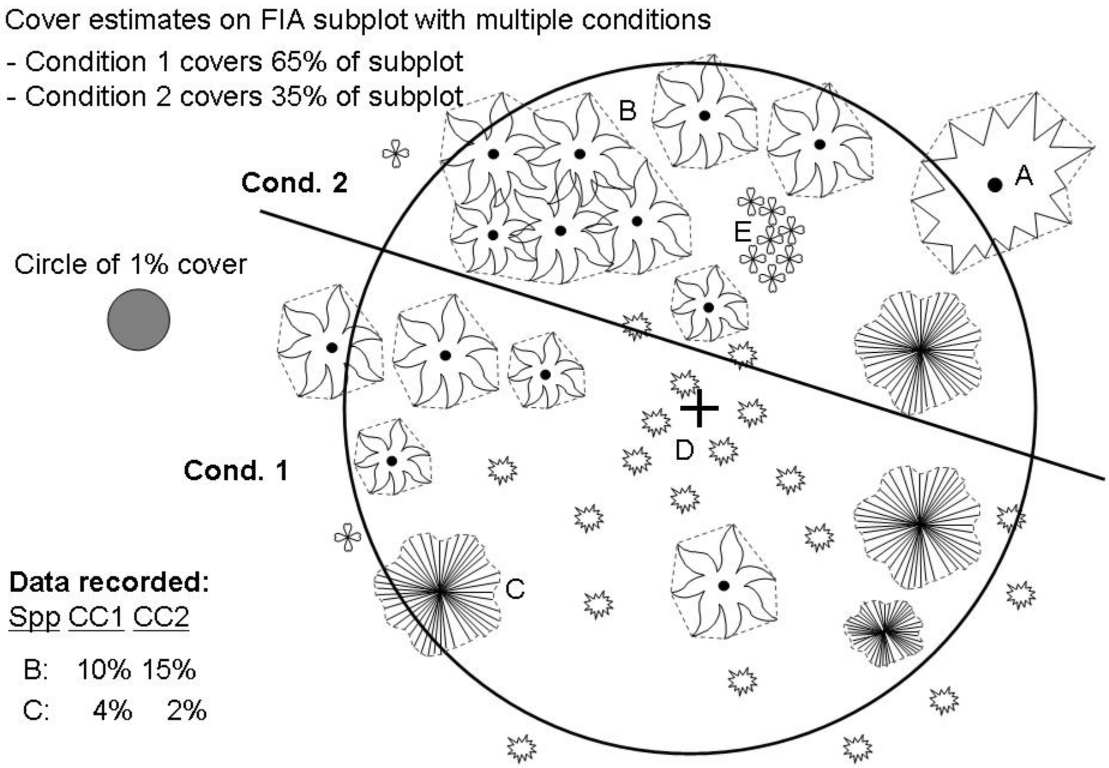


Figure 59. Example of species cover estimation on a subplot with 2 conditions. See figure 54 for total cover across the subplot. In figure 54, species A, D, and E would be included in estimates of vegetation structure by growth habit, but not recorded for species composition. Note that species with subplot cover <3% are not recorded, but that cover recorded on a condition can be less than 3%.

8.6.1 SPECIES GROWTH HABIT

Record the growth habit of the species. Tally tree species are always recorded as trees, even when they exhibit a shrub-like growth habit. However, because many species can exhibit various growth habits, it is important to note which growth habit each recorded species is demonstrating on the current condition. If a species has more than one growth habit on a condition in a subplot, record the one which is most prevalent; however, both tree habits (SD and LT) can be coded for the same species if LEVEL OF DETAIL=3 and the species is found in both size classes. A species may be recorded with a different growth habit on a different subplot-condition on the same plot.

When collected: LEVEL OF DETAIL = 2 or 3, and for each species recorded below.
Field width: 2 alphanumeric characters
Tolerance: No errors
MQO: At least 95% of the time

Values:

SD Seedlings Saplings: Small trees less than 5 inches DBH or DRC, including tally and non-tally tree species. Up to four species are included if individual species total cover is at least 3% of subplot area when LEVEL Of DETAIL = 2 or LEVEL Of DETAIL =3.

SH Shrubs:/Woody Vines: Woody, multiple-stemmed plants of any size, and vines. Most cacti are included in this category. Up to four species are recorded if individual species total cover is at least 3% of the subplot area when LEVEL Of DETAIL = 2 or LEVEL Of DETAIL =3.

FB Forbs: Herbaceous, broad-leaved plants; includes non-woody-vines, ferns (does not include mosses and cryptobiotic crusts). Up to four species are recorded if individual species total cover is at least 3% of the subplot area when LEVEL Of DETAIL = 2 or LEVEL Of DETAIL =3.

GR Graminoids: Grasses and grass-like plants (includes rushes and sedges). Up to four species are recorded if individual species total cover is at least 3% of the subplot area when LEVEL Of DETAIL = 2 or LEVEL Of DETAIL =3.

LT Large Trees: Up to four species of large trees (DBH or DRC at least 5 inches) are recorded if individual species cover is at least 3% of the subplot area, including both tally and non-tally tree species, when LEVEL Of DETAIL = 3.

8.6.2 SPECIES CODE

Record a code for each sampled vascular plant species found rooted in or overhanging the sampled condition of the subplot at any height. Species codes must be the standardized codes in the Natural Resource Conservation Service (NRCS) PLANTS database (currently January 2010 version). Identification to species only is expected. However, if subspecies information is known, enter the appropriate NRCS code. For graminoids, genus and unknown codes are acceptable, but do not lump species of the same genera or unknown code. For example, if several unknown CAREX species are present, only record the individual species present with cover of at least 3 percent.

If a plant cannot be identified quickly and confidently, assign a NRCS PLANTS genus or unknown code appropriate to the species. Collect a specimen away from the subplot unless the species is locally sparse or another SPECIMEN NOT COLLECTED REASON CODE (8.6.6) applies. A species is “locally sparse” if 5 or fewer plants are present in the entire plot (4 subplots) and immediate surrounding area. A species may be sparse and still meet the criteria for inclusion in species composition, but this will be rare.

Acceptable unknown codes

Code	Common Name
2FERN	Fern or Fern Ally
2FORB	Forb (herbaceous, not grass nor grasslike)
2FD	Forb, dicot
2FM	Forb, monocot
2GRAM	Graminoid (grass or grasslike)
2GA	Grass, annual
2GP	Grass, perennial
2GL	Grass-like, (sedges and rushes)
2PLANT	Plant
2SHRUB	Shrub (>.5m)
2SUBS	Subshrub (<.5m)
2TREE	Tree
2VH	Vine, herbaceous
2VW	Vine, woody

When collected: LEVEL OF DETAIL = 2 or 3 and species canopy cover on the full subplot is 3% or greater.
Field width: 8 alpha-numeric characters
Tolerance: No errors
MQO: At least 80% of the time
Values: Accepted NRCS species code when the species is known, or an accepted NRCS genus or unknown code when the species is not known

8.6.3 UNIQUE SPECIES NUMBER

When any code is entered for the first time on a plot, it is assigned UNIQUE SPECIES NUMBER = 1. If more than one unidentified species is discovered that is described by the same genus or unknown code, the next sequential number is assigned. If a recorded unidentified species is encountered again elsewhere on the plot, the field crew records the species with the same genus or unknown code with the same unique species number.

When collected: All species recorded
Field width: 2 digits
Tolerance: No errors
MQO: At least 99% of the time
Values: 1-99, assigned in sequential numbers

8.6.4 SPECIES CANOPY COVER

For each species recorded, estimate and record the canopy cover present on the subplot-condition to the nearest 1 percent (note: cover is always recorded as a percent of the full subplot area, even if the condition being assessed does not cover the full subplot—see example under item 8.6). Canopy cover is identified as the area of ground surface covered by the outline of the foliage, ignoring any normal spaces occurring between the leaves of plants (Daubenmire 1959) by the canopy of each plant species (fig. 57). Do not count overlapping crowns within a species. When recording cover for seedlings and saplings (SPECIES GROWTH HABIT=SD), do not include any canopy from trees greater than or equal to 5 inches DBH (DRC for woodland species), regardless of how close to the ground the canopy extends. When LEVEL OF DETAIL=3, a separate estimate is made for the canopy of trees greater than or equal to 5 inches DBH/DRC.

When collected: For each plant species present on the subplot with canopy cover greater than or equal to 3%. A plant species is defined as a unique SPECIES CODE and UNIQUE SPECIES NUMBER pair.
Field width: 3 digits
Tolerance: +/- 1 class based on the following canopy cover classes: 1%, 2-5%, 6-10%, 11-25%, 26-50%, 51-75%, 76-95%, 96-100%
MQO: at least 90% of the time
Values: 001-100

8.6.5 SPECIES VEGETATION LAYER

For each individual species recorded, assign one of the vegetation layers. These layers illustrate the vertical diversity of the predominant species found on the subplot.

Assign each plant species record to only one of the vegetation layers. If a plant species in a growth habit is found in more than one layer, assign the entire plant to the layer where most of the cover occurs. If a species occupies multiple layers equally, assign the highest of the equally occupied layers. If a plant has a seed head that grows much taller than the rest of the plant, record the layer that the main part of the plant is in, not the top of the seed head.

When collected: For each species recorded.
Field width: 1 digits
Tolerance: No errors
MQO: At least 90% of the time
Values: 1-4

1 0 to 2.0 feet
2 2.1 to 6.0 feet
3 6.1 to 16.0 feet
4 Greater than 16 feet

8.6.6 SPECIMEN OFFICIALLY COLLECTED

Record if a specimen was collected or not for each species, genus or unknown code entered as a new unique species.

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

0 No, a specimen was not collected
1 Yes, a specimen was collected

8.6.7 SPECIMEN LABEL NUMBER

Record the label number for the collected specimen. Pre-numbered labels are provided to each crew by the regional coordinator.

When collected: SPECIMEN OFFICIALLY COLLECTED = 1
Field width: 5 digits
Tolerance: No errors
MQO: At least 99% of the time
Values: 1 to 99999, as pre-printed and assigned by region

8.6.8 P2 SPECIMEN NOT COLLECTED REASON CODE

Record the code that describes why a specimen has not been collected.

When collected: An unknown code or genus code is entered and SPECIMEN OFFICIALLY COLLECTED = 0
Field width: 2 digits
Tolerance: No errors
MQO: At least 99% of the time
Values:

01 Species is locally sparse (fewer than 5 individual plants in area of the plot)
02 Species has no mature foliage or reproductive parts present, so is unlikely to be identifiable if collected.
03 Hazardous situation
04 Time limitation
05 Wilderness or reserved land where plant collections are not allowed
06 Specimen collected for immediate/local identification
07 Not required by inventory unit
10 Other (explain in notes)

8.6.9 VEGETATION SPECIES NOTES

Notes may be entered for any species encountered, but are required for each new species that is not identified. Enter text that describes the species. This text may be used in the specimen label and unknown report.

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

9.0 INVASIVE PLANTS

The objectives of the Phase 2 (P2) invasive plants protocol are to document abundance and monitor changes in abundance of selected species over time. Combined with other plot data and other datasets, this data can be used to predict the future spread of selected species. Invasive plant species are having tremendous economic and ecological impacts on our nation's forests, and the impacts are increasing over time. Providing accurate, statistically valid estimates of the distribution and abundance of some of the most damaging species will give managers and policy-makers a better understanding of the problem than they would otherwise have.

Each FIA unit, in collaboration with vegetation experts, has developed lists of the most important invasive species to monitor on forested lands. Depending on local needs or forest conditions, there may be different lists of species for individual states or portions of states. Changes to the species on these lists are managed by the individual FIA units using local change procedures. However, when an FIA unit samples invasive species, they will use the field protocols contained in this chapter.

Data will be collected by crew members who have been trained and certified in the Invasive plants protocol methods. These crew members are expected to have field guides that allow for unambiguous identification of the plant species on the list they are to use, and training in field identification and cover estimation of those species under different conditions.

Note: Avoid becoming part of the problem! There is a risk that field crews walking into plot locations could pick up seeds along roadsides or other patches of invasive plants and spread them through the forest and on to the plot. Be aware of the vegetation you are traveling through and consider stopping and removing seeds from boots and clothing before entering uninvaded lands, particularly remote areas that are rarely visited.

9.1 Invasive species sample design

Phase 2 sampling of invasive species is most often focused on accessible forest condition classes within the 24.0-foot radius subplot. If the total area of all accessible forest land condition classes is less than 100 percent on a subplot, **invasive species measurements are done only on the portion that is in accessible forest land condition classes**. If multiple accessible forested condition classes are present on the subplot, separate estimates are made for each condition class on the subplot. Canopy cover estimates are only made for the area within accessible forest condition(s)—for example, vegetation cover over-hanging a nonforest road condition <u>is not included</u> in the estimate.

However, each FIA unit has the **option to also sample invasive species on accessible nonforest land conditions (condition status 2)**, where desired or funded by specific landowners (e.g., on some National Forests in the West). Where this is done, estimates of invasive species abundance are maintained separately on forest and nonforest conditions.

Canopy cover is estimated for any listed invasive species present on the measured condition(s) of a subplot, regardless of abundance (i.e., there is not minimum cover threshold for sampling)(appendix 9). When crews are not sure about the identification of a plant that might be a listed invasive, they are encouraged to collect specimens for later identification (appendix 10). Rules and expectations for plant collection and identification are specified by individual FIA units.

9.2 Species Records

The invasive plant recorder does a search of each measured condition on the subplot. **Only** listed species rooted in or overhanging (and rooted out of) this condition are included. For tree species, there are no minimum (or maximum) height limits as are required for seedling counts. All vegetation and plant parts that are or were alive during the current growing season are included in the cover estimates (e.g., brown Canada thistle in late summer is counted, live buds on Russian olive in late fall are used to estimate crown cover).

Total cover is estimated on measured conditions on each 24.0-foot radius subplot for every species on the invasive plant list found. If multiple conditions are being sampled on the same subplot, separate cover estimates for every species must be made .

9.3 INVASIVE PLANT SAMPLING STATUS (Plot-level variable)
Determines whether invasive plant data will be recorded on the plot and the land class(es) on which it will be recorded.

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

0 Not collecting invasive plant data
1 Invasive plant data collected only on accessible forest land conditions (CONDITION CLASS STATUS = 1)
2 Invasive plant data collected on all accessible land conditions (CONDITION CLASS STATUS =1 OR NONFOREST CONDITION STATUS=2)

9.4 SUBPLOT NUMBER
Record the code corresponding to the number of the subplot.

When collected: On all subplots where INVASIVE PLANT SAMPLING STATUS = 1 or 2
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

9.5 INVASIVE PLANT SUBPLOT STATUS (Subplot-level variable)
Record the code to indicate whether the subplot was sampled for invasive plants. A subplot may be sampled but not have any invasive plants present. If there is **any** part of an accessible portion of the subplot where other plot measurements are made but invasive plants can’t be assessed (e.g., because of snow, water, hazardous weather, time limitation), enter code 3 and do not record **any** invasive plant measurements.

When collected: On all subplots where (INVASIVE PLANT SAMPLING STATUS=1 and SUBPLOT STATUS=1) or (INVASIVE PLANT SAMPLING STATUS=2 and NONFOREST SUBPLOT STATUS=2)
Field width: 1 digit
Tolerance: No errors
MQO: At least 99% of the time
Values:

1 Subplot sampled, invasive plants present
2 Subplot sampled, no invasive plants present
3 Subplot not sampled for invasive plants

9.6 INVASIVE PLANT NONSAMPLED REASON (Subplot-level variable)
Record the reason why a subplot cannot be sampled for invasive plants.

When collected: On all subplots where INVASIVE PLANT SUBPLOT STATUS = 3
Field width: 2 digits
Tolerance: No errors
MQO: At least 99% of the time
Values:

4	Time limitation
5	Lost data (office use only)
10	Other (for example, snow or water covering vegetation that is supposed to be sampled)

9.7 INVASIVE PLANT DATA NOTES
Use this field to record any notes about the condition on the subplot, particularly any unusual conditions encountered.

When collected: INVASIVE PLANT NONSAMPLED REASON=10 or as needed
Field width: Unlimited alphanumeric character field
Tolerance: N/A
MQO: N/A
Values: English language words, phrases, and numbers

9.8 CONDITION CLASS NUMBER
Record the number for the measured condition class in which the invasive plant(s) is found. If multiple measured conditions occur on the same subplot, data will be collected for each condition separately.

When collected: Any condition class where (INVASIVE PLANT SAMPLING STATUS=1 and CONDITION CLASS STATUS=1) or (INVASIVE PLANT SAMPLING STATUS=2 and NONFOREST CONDITION CLASS STATUS=2).
Field width: 1 digit
Tolerance: No errors
MQO: At least 99% of the time
Values: 1-9

9.9 SPECIES CODE
Record the code for any species listed in appendix 9 that is found rooted in or overhanging (and rooted out of) the measured condition within the subplot. Species codes must be the standardized codes in the Natural Resource Conservation Service (NRCS) PLANTS database January 2010 version maintained by the FIA IM group (USDA, NRCS. 2010. The PLANTS database [http://plants.usda.gov/plants]. National Plant Data Center, Baton Rouge, LA 70874-4490).

In many of the invasive plant ID guides used by FIA units, some species are grouped together in the ID descriptions, and it may be difficult to distinguish between them with the information provided. In addition, some plants may be hybrids of listed species. Enter the code for the most likely species in the group, or the first one in the group if you are not sure.

If a species is suspected of being a listed invasive but cannot be identified quickly and confidently, and the FIA unit's protocols require specimen collection, assign a NRCS PLANTS unknown code. A subset of acceptable unknown codes that can be used is listed below. Collect a specimen unless the species is locally sparse. A species is "locally sparse" if five or fewer plants are present in the entire plot (4 subplots) and immediate surrounding area.

Unknown Code	Common Name
2FERN	Fern or Fern Ally
2FORB	Forb (herbaceous, not grass nor grasslike)
2GRAM	Graminoid (grass or grasslike)
2PLANT	Plant
2SHRUB	Shrub (>.5m)
2SUBS	Subshrub (<.5m)
2TREE	Tree
2VH	Vine, herbaceous
2VW	Vine, woody

When collected: On all conditions within subplots where INVASIVE PLANT SUBPLOT STATUS=1 and ((INVASIVE PLANT SAMPLING STATUS=1 and CONDITION CLASS STATUS=1) or (INVASIVE PLANT SAMPLING STATUS=2 and NONFOREST CONDITION CLASS STATUS=2)).
Field width: 8 alpha-numeric characters
Tolerance: No errors
MQO: At least 99% of the time
Values: Accepted NRCS species code from the appropriate list for the unit when the species is known, or a NRCS unknown code when the species is not known.

9.10 UNIQUE SPECIES NUMBER

When any species code is entered for the first time on a plot, the UNIQUE SPECIES NUMBER assigned is "1". If more than one unidentified species is recorded that is described by the same unknown code, the next sequential number is assigned. If a previously-recorded unidentified species is encountered again elsewhere on the plot, the UNIQUE SPECIES NUMBER that corresponds to the earlier encountered specimen must be entered. For example, an unknown thistle and unknown hawkweed would both be given a species code of "2FORB" but would need to be given different UNIQUE SPECIES NUMBERs when measured.

When collected: All species records
Field width: 2 digits
Tolerance: No errors
MQO: At least 99% of the time
Values: 1-99, assigned in sequential numbers

9.11 SPECIES CANOPY COVER

A rapid canopy cover estimate, to the nearest percent cover, is made for each species for all foliage across all layer heights. **Canopy cover is based on a vertically-projected polygon described by the outline of the foliage**, ignoring any normal spaces occurring between the leaves of plants (Daubenmire 1959), and ignoring overlap among multiple layers of a species. For each species, cover can never exceed 100 percent. Cover is estimated for each measured condition on the subplot separately. However, the foliage **cover is always estimated as a percent of an entire subplot**. For example, on a subplot with two sampled conditions, a species occurs with a cover equal to a circle with a radius of 7.6 feet on the full subplot, or 10 percent cover. On condition class #1 it covers an area equal to a circle of 2.4 feet radius and is recorded as 1 percent cover. The remainder, 9 percent cover, is recorded for condition #2. If the species is only present on condition class #1 with an area equal to a circle of 2.4-feet radius it is recorded as 1 percent. The proportion of the subplot in each condition does not matter.

If cover is greater than 0 but less than 1.5 percent, record as 1 percent cover. For species of moderate cover, it may be easiest to divide the subplots into quarters, estimate canopy cover of each quarter separately, and then add them together. The following area-cover sizes may be useful in developing estimates for an entirely forested subplot:

Subplot radius = 24.0 feet, Subplot area = 1809 ft^2			
Cover	Area (ft^2)	Length of a side of a square(ft)	Radius of circular area(ft)
1%	18	4.3	2.4
3%	54	7.4	4.1
5%	90	9.5	5.3
10%	181	13.4	7.6
20%	362	19	10.7

When collected: All species records
Field width: 3 digits
Tolerance: +/- 1 class based on the following canopy cover classes: 1%, 2-5%, 6-10%, 11-25%, 26-50%, 51-75%, 76-95%, 96-100%
MQO: At least 90% of the time
Values: 001 to 100

9.12 INVASIVE PLANT SPECIMEN COLLECTION RULE (Plot-level variable)

Downloaded code to indicate if collection of specimens of unknown invasive species is required.

When collected: Downloaded on all plots where INVASIVE PLANT SAMPLING STATUS = 1 or 2
Field width: 1 digit
Tolerance: No errors
MQO: At least 99% of the time
Values:

0 FIA unit does not require specimen collection for invasive plants
1 FIA unit requires specimen collection for invasive plants

9.13 INVASIVE SPECIMEN COLLECTED

Record if a specimen was collected for each species or unknown code. If the record is an unknown code, your unit requires specimen collection, and a plant specimen is not collected, describe the reason it was not collected in 9.15, INVASIVE PLANT NOTES.

When collected: Each record where INVASIVES PLANT SUBPLOT STATUS=1, INVASIVE PLANT SPECIMEN COLLECTION RULE = 1, and an unknown SPECIES CODE was used.
Field width: 1 digit
Tolerance: No errors
MQO: At least 99% of the time

Values:

0	No, a specimen was not officially collected
1	Yes, a specimen was officially collected

9.14 SPECIMEN LABEL NUMBER

Record the label number for the collected specimen. Where plant specimen collection is required, numbered labels are provided to each crew.

When collected: Where INVASIVE SPECIMEN COLLECTED=1
Field width: 5 digits
Tolerance: No errors
MQO: At least 99% of the time
Values: 1 to 99999, as pre-printed and assigned by FIA unit.

9.15 INVASIVE PLANT NOTES

Notes are **required** for each species record with an unknown code. Enter text that describes the species or that explains why it was not collected if collection was required but not done. This text may be used on the specimen label and any spreadsheet used to track specimens.

When collected: Required for each record with an unknown code and SPECIMEN LABEL NUMBER.
Field width: Unlimited alphanumeric character field
Tolerance: N/A
MQO: N/A
Values: English language words, phrases, and numbers

9.16 References

Daubenmire, R. 1959. A canopy-coverage method of vegetational analysis. Northwest Science 33(1): 43-64.

APPENDICES

1. State and County, Parish or Borough FIPS Codes

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

2. FIA Forest Type Codes

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

3. FIA Tree Species Codes

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

4. Site Tree Selection Criteria and Species List

5. Determination of Stocking Values for Land Use Classification

6. Glossary

7. Tolerance / MQO / Value / Units Table

8. Tree Coding Guide

9. Invasive Plant List

10. Unknown Plant Specimen Collection

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

(02) Alaska
(013) Aleutians East Borough
(016) Aleutians West Census Area
(020) Anchorage Borough
(050) Bethel Census Area
(060) Bristol Bay Borough
(068) Denali Borough
(070) Dillingham Census Area
(090) Fairbanks North Star Borough
(100) Haines Borough
(110) Juneau Borough
(122) Kenai Peninsula Borough
(130) Ketchikan Gateway Borough
(150) Kodiak Island Borough
(164) Lake and Peninsula Borough
(170) Matanuska-Susitna Borough
(180) Nome Census Area
(185) North Slope Borough
(188) Northwest Arctic Borough
(201) Prince of Wales-Outer Ketchikan Census Area
(220) Sitka Borough
(232) Skagway-Hoonah-Angoon Census Area
(240) Southeast Fairbanks Census Area
(261) Valdez-Cordova Census Area
(270) Wade Hampton Census Area
(280) Wrangell-Petersburg Census Area
(282) Yakutat Borough
(290) Yukon-Koyukuk Census Area

(04) Arizona
(001) Apache
(003) Cochise
(005) Coconino
(007) Gila
(009) Graham
(011) Greenlee
(012) La Paz
(013) Maricopa
(015) Mohave
(017) Navajo
(019) Pima
(021) Pinal
(023) Santa Cruz
(025) Yavapai
(027) Yuma

(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

(06) California
(001) Alameda
(003) Alpine
(005) Amador
(007) Butte
(009) Calaveras
(011) Colusa
(013) Contra Costa
(015) Del Norte
(017) El Dorado
(019) Fresno
(021) Glenn
(023) Humboldt
(025) Imperial
(027) Inyo
(029) Kern
(031) Kings
(033) Lake
(035) Lassen
(037) Los Angeles
(039) Madera
(041) Marin
(043) Mariposa
(045) Mendocino
(047) Merced
(049) Modoc
(051) Mono
(053) Monterey
(055) Napa
(057) Nevada
(059) Orange
(061) Placer
(063) Plumas
(065) Riverside
(067) Sacramento
(069) San Benito
(071) San Bernardino
(073) San Diego
(075) San Francisco
(077) San Joaquin
(079) San Luis Obispo
(081) San Mateo
(083) Santa Barbara
(085) Santa Clara
(087) Santa Cruz
(089) Shasta
(091) Sierra
(093) Siskiyou
(095) Solano
(097) Sonoma
(099) Stanislaus
(101) Sutter
(103) Tehama
(105) Trinity
(107) Tulare
(109) Tuolumne
(111) Ventura
(113) Yolo
(115) Yuba

(08) Colorado
(001) Adams
(003) Alamosa
(005) Arapahoe
(007) Archuleta
(009) Baca
(011) Bent
(013) Boulder
(015) Chaffee
(017) Cheyenne
(019) Clear Creek
(021) Conejos
(023) Costilla
(025) Crowley
(027) Custer
(029) Delta
(031) Denver
(033) Dolores
(035) Douglas
(037) Eagle
(039) Elbert
(041) El Paso
(043) Fremont
(045) Garfield
(047) Gilpin
(049) Grand
(051) Gunnison
(053) Hinsdale
(055) Huerfano
(057) Jackson
(059) Jefferson
(061) Kiowa
(063) Kit Carson
(065) Lake
(067) La Plata
(069) Larimer
(071) Las Animas
(073) Lincoln
(075) Logan
(077) Mesa
(079) Mineral
(081) Moffat
(083) Montezuma
(085) Montrose
(087) Morgan
(089) Otero
(091) Ouray
(093) Park
(095) Phillips
(097) Pitkin
(099) Prowers
(101) Pueblo
(103) Rio Blanco
(105) Rio Grande
(107) Routt
(109) Saguache
(111) San Juan
(113) San Miguel
(115) Sedgewick
(117) Summit
(119) Teller

(121) Washington
(123) Weld
(125) Yuma

(09) Connecticut
(001) Fairfield
(003) Hartford
(005) Litchfield
(007) Middlesex
(009) New Haven
(011) New London
(013) Tolland
(015) Windham

(10) Delaware
(001) Kent
(003) New Castle
(005) Sussex

(11) District of Columbia
(001) District of Columbia

(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

(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

(15) Hawaii
(001) Hawaii
(005) Kalawao
(003) Honolulu
(007) Kauai
(009) Maui

(16) Idaho
(001) Ada
(003) Adams
(005) Bannock
(007) Bear Lake
(009) Benewah
(011) Bingham
(013) Blaine
(015) Boise
(017) Bonner
(019) Bonneville
(021) Boundary
(023) Butte
(025) Camas
(027) Canyon
(029) Caribou
(031) Cassia
(033) Clark
(035) Clearwater
(037) Custer
(039) Elmore
(041) Franklin
(043) Fremont
(045) Gem
(047) Gooding
(049) Idaho
(051) Jefferson
(053) Jerome
(055) Kootenai
(057) Latah
(059) Lemhi
(061) Lewis
(063) Lincoln
(065) Madison
(067) Minidoka
(069) Nez Perce
(071) Oneida
(073) Owyhee
(075) Payette
(077) Power
(079) Shoshone
(081) Teton
(083) Twin Falls
(085) Valley
(087) Washington
(089) Yellowstone National Park

(17) Illinois
(001) Adams
(003) Alexander
(005) Bond
(007) Boone
(009) Brown
(011) Bureau
(013) Calhoun
(015) Carroll
(017) Cass
(019) Champaign
(021) Christian
(023) Clark
(025) Clay
(027) Clinton
(029) Coles
(031) Cook
(033) Crawford
(035) Cumberland
(037) DeKalb
(039) De Witt
(041) Douglas
(043) DuPage
(045) Edgar
(047) Edwards
(049) Effingham
(051) Fayette
(053) Ford
(055) Franklin

(057) Fulton
(059) Gallatin
(061) Greene
(063) Grundy
(065) Hamilton
(067) Hancock
(069) Hardin
(071) Henderson
(073) Henry
(075) Iroquois
(077) Jackson
(079) Jasper
(081) Jefferson
(083) Jersey
(085) Jo Daviess
(087) Johnson
(089) Kane
(091) Kankakee
(093) Kendall
(095) Knox
(097) Lake
(099) La Salle
(101) Lawrence
(103) Lee
(105) Livingston
(107) Logan
(109) McDonough
(111) McHenry
(113) McLean
(115) Macon
(117) Macoupin
(119) Madison
(121) Marion
(123) Marshall
(125) Mason
(127) Massac
(129) Menard
(131) Mercer
(133) Monroe
(135) Montgomery
(137) Morgan
(139) Moultrie
(141) Ogle
(143) Peoria
(145) Perry
(147) Piatt
(149) Pike
(151) Pope
(153) Pulaski
(155) Putnam
(157) Randolph
(159) Richland
(161) Rock Island
(163) St. Clair
(165) Saline
(167) Sangamon
(169) Schuyler
(171) Scott
(173) Shelby
(175) Stark
(177) Stephenson
(179) Tazewell
(181) Union
(183) Vermilion
(185) Wabash
(187) Warren
(189) Washington
(191) Wayne
(193) White
(195) Whiteside
(197) Will
(199) Williamson
(201) Winnebago
(203) Woodford

(18) Indiana
(001) Adams
(003) Allen
(005) Bartholomew
(007) Benton
(009) Blackford
(011) Boone
(013) Brown
(015) Carroll
(017) Cass
(019) Clark
(021) Clay
(023) Clinton
(025) Crawford
(027) Daviess
(033) De Kalb
(029) Dearborn
(031) Decatur
(035) Delaware
(037) Dubois
(039) Elkhart
(041) Fayette
(043) Floyd
(045) Fountain
(047) Franklin
(049) Fulton
(051) Gibson
(053) Grant
(055) Greene
(057) Hamilton
(059) Hancock
(061) Harrison
(063) Hendricks
(065) Henry
(067) Howard
(069) Huntington
(071) Jackson
(073) Jasper
(075) Jay
(077) Jefferson
(079) Jennings
(081) Johnson
(083) Knox
(085) Kosciusko
(087) Lagrange
(089) Lake
(091) La Porte
(093) Lawrence
(095) Madison
(097) Marion
(099) Marshall
(101) Martin
(103) Miami
(105) Monroe
(107) Montgomery
(109) Morgan
(111) Newton
(113) Noble
(115) Ohio
(117) Orange
(119) Owen
(121) Parke
(123) Perry
(125) Pike
(127) Porter
(129) Posey
(131) Pulaski
(133) Putnam
(135) Randolph
(137) Ripley
(139) Rush
(143) Scott
(145) Shelby
(147) Spencer
(141) St. Joseph
(149) Starke
(151) Steuben
(153) Sullivan
(155) Switzerland
(157) Tippecanoe
(159) Tipton
(161) Union
(163) Vanderburgh
(165) Vermillion
(167) Vigo
(169) Wabash
(171) Warren
(173) Warrick
(175) Washington
(177) Wayne
(179) Wells
(181) White
(183) Whitley

(19) Iowa
(001) Adair
(003) Adams
(005) Allamakee
(007) Appanoose
(009) Audubon
(011) Benton
(013) Black Hawk
(015) Boone
(017) Bremer
(019) Buchanan
(021) Buena Vista
(023) Butler
(025) Calhoun
(027) Carroll
(029) Cass
(031) Cedar
(033) Cerro Gordo
(035) Cherokee
(037) Chickasaw
(039) Clarke
(041) Clay
(043) Clayton
(045) Clinton
(047) Crawford
(049) Dallas
(051) Davis
(053) Decatur
(055) Delaware
(057) Des Moines
(059) Dickinson
(061) Dubuque
(063) Emmet
(065) Fayette
(067) Floyd
(069) Franklin
(071) Fremont
(073) Greene
(075) Grundy
(077) Guthrie
(079) Hamilton
(081) Hancock
(083) Hardin
(085) Harrison
(087) Henry
(089) Howard
(091) Humboldt
(093) Ida
(095) Iowa
(097) Jackson
(099) Jasper
(101) Jefferson
(103) Johnson
(105) Jones
(107) Keokuk
(109) Kossuth
(111) Lee
(113) Linn
(115) Louisa
(117) Lucas
(119) Lyon
(121) Madison
(123) Mahaska
(125) Marion
(127) Marshall
(129) Mills
(131) Mitchell
(133) Monona
(135) Monroe
(137) Montgomery
(139) Muscatine
(141) O'Brien
(143) Osceola
(145) Page
(147) Palo Alto
(149) Plymouth
(151) Pocahontas
(153) Polk
(155) Pottawattamie
(157) Poweshiek
(159) Ringgold
(161) Sac
(163) Scott
(165) Shelby
(167) Sioux
(169) Story
(171) Tama
(173) Taylor
(175) Union
(177) Van Buren
(179) Wapello
(181) Warren
(183) Washington
(185) Wayne
(187) Webster
(189) Winnebago
(191) Winneshiek
(193) Woodbury
(195) Worth
(197) Wright

(20) Kansas
(001) Allen
(003) Anderson
(005) Atchison
(007) Barber
(009) Barton
(011) Bourbon
(013) Brown
(015) Butler
(017) Chase
(019) Chautauqua
(021) Cherokee
(023) Cheyenne
(025) Clark
(027) Clay
(029) Cloud
(031) Coffey
(033) Comanche
(035) Cowley
(037) Crawford
(039) Decatur
(041) Dickinson
(043) Doniphan
(045) Douglas
(047) Edwards
(049) Elk
(051) Ellis
(053) Ellsworth
(055) Finney
(057) Ford
(059) Franklin
(061) Geary
(063) Gove
(065) Graham
(067) Grant
(069) Gray
(071) Greeley
(073) Greenwood
(075) Hamilton
(077) Harper
(079) Harvey
(081) Haskell
(083) Hodgeman
(085) Jackson
(087) Jefferson
(089) Jewell
(091) Johnson
(093) Kearny
(095) Kingman
(097) Kiowa
(099) Labette
(101) Lane
(103) Leavenworth
(105) Lincoln
(107) Linn
(109) Logan
(111) Lyon
(113) McPherson
(115) Marion
(117) Marshall
(119) Meade
(121) Miami
(123) Mitchell
(125) Montgomery
(127) Morris
(129) Morton

(131) Nemaha
(133) Neosho
(135) Ness
(137) Norton
(139) Osage
(141) Osborne
(143) Ottawa
(145) Pawnee
(147) Phillips
(149) Pottawatomie
(151) Pratt
(153) Rawlins
(155) Reno
(157) Republic
(159) Rice
(161) Riley
(163) Rooks
(165) Rush
(167) Russell
(169) Saline
(171) Scott
(173) Sedgwick
(175) Seward
(177) Shawnee
(179) Sheridan
(181) Sherman
(183) Smith
(185) Stafford
(187) Stanton
(189) Stevens
(191) Sumner
(193) Thomas
(195) Trego
(197) Wabaunsee
(199) Wallace
(201) Washington
(203) Wichita
(205) Wilson
(207) Woodson
(209) Wyandotte

(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

(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

(23) Maine
(001) Androscoggin
(003) Aroostook
(005) Cumberland
(007) Franklin
(009) Hancock
(011) Kennebec
(013) Knox
(015) Lincoln
(017) Oxford
(019) Penobscot
(021) Piscataquis
(023) Sagadahoc
(025) Somerset
(027) Waldo
(029) Washington
(031) York

(24) Maryland
(100) Allegany
(003) Anne Arundel
(005) Baltimore
(009) Calvert
(011) Caroline
(013) Carroll
(015) Cecil
(017) Charles
(019) Dorchester
(021) Frederick
(023) Garrett
(025) Harford
(027) Howard
(029) Kent
(031) Montgomery
(033) Prince Georges
(035) Queen Annes
(037) St. Marys
(039) Somerset
(041) Talbot
(043) Washington
(045) Wicomico
(047) Worcester
(510) Baltimore City

(25) Massachusetts
(001) Barnstable
(003) Berkshire
(005) Bristol
(007) Dukes
(009) Essex
(011) Franklin
(013) Hampden
(015) Hampshire
(017) Middlesex
(019) Nantucket
(021) Norfolk
(023) Plymouth
(025) Suffolk
(027) Worcester
(029) Washington
(031) York

(26) Michigan
(001) Alcona
(003) Alger
(005) Allegan
(007) Alpena
(009) Antrim
(011) Arenac
(013) Baraga
(015) Barry
(017) Bay
(019) Benzie
(021) Berrien
(023) Branch
(025) Calhoun
(027) Cass
(029) Charlevoix
(031) Cheboygan
(033) Chippewa
(035) Clare
(037) Clinton
(039) Crawford
(041) Delta
(043) Dickinson
(045) Eaton
(047) Emmet
(049) Genesee
(051) Gladwin
(053) Gogebic
(055) Grand Traverse
(057) Gratiot
(059) Hillsdale
(061) Houghton
(063) Huron
(065) Ingham
(067) Ionia
(069) Iosco
(071) Iron
(073) Isabella
(075) Jackson
(077) Kalamazoo
(079) Kalkaska
(081) Kent
(083) Keweenaw
(085) Lake
(087) Lapeer

(089) Leelanau
(091) Lenawee
(093) Livingston
(095) Luce
(097) Mackinac
(099) Macomb
(101) Manistee
(103) Marquette
(105) Mason
(107) Mecosta
(109) Menominee
(111) Midland
(113) Missaukee
(115) Monroe
(117) Montcalm
(119) Montmorency
(121) Muskegon
(123) Newaygo
(125) Oakland
(127) Oceana
(129) Ogemaw
(131) Ontonagon
(133) Osceola
(135) Oscoda
(137) Otsego
(139) Ottawa
(141) Presque Isle
(143) Roscommon
(145) Saginaw
(147) St. Clair
(149) St. Joseph
(151) Sanilac
(153) Schoolcraft
(155) Shiawassee
(157) Tuscola
(159) Van Buren
(161) Washtenaw
(163) Wayne
(165) Wexford

(27) Minnesota
(001) Aitkin
(003) Anoka
(005) Becker
(007) Beltrami
(009) Benton
(011) Big Stone
(013) Blue Earth
(015) Brown
(017) Carlton
(019) Carver
(021) Cass
(023) Chippewa
(025) Chisago
(027) Clay
(029) Clearwater
(031) Cook
(033) Cottonwood
(035) Crow Wing
(037) Dakota
(039) Dodge
(041) Douglas
(043) Faribault
(045) Fillmore
(047) Freeborn
(049) Goodhue
(051) Grant
(053) Hennepin
(055) Houston
(057) Hubbard
(059) Isanti
(061) Itasca
(063) Jackson
(065) Kanabec
(067) Kandiyohi
(069) Kittson
(071) Koochiching
(073) Lac qui Parle
(075) Lake
(077) Lake of the Woods
(079) Le Sueur
(081) Lincoln
(083) Lyon
(085) McLeod
(087) Mahnomen
(089) Marshall
(091) Martin
(093) Meeker
(095) Mille Lacs
(097) Morrison
(099) Mower
(101) Murray
(103) Nicollet
(105) Nobles
(107) Norman
(109) Olmsted
(111) Otter Tail
(113) Pennington
(115) Pine
(117) Pipestone
(119) Polk
(121) Pope
(123) Ramsey
(125) Red Lake
(127) Redwood
(129) Renville
(131) Rice
(133) Rock
(135) Roseau
(137) St. Louis
(139) Scott
(141) Sherburne
(143) Sibley
(145) Stearns
(147) Steele
(149) Stevens
(151) Swift
(153) Todd
(155) Traverse
(157) Wabasha
(159) Wadena
(161) Waseca
(163) Washington
(165) Watonwan
(167) Wilkin
(169) Winona
(171) Wright
(173) Yellow Medicine

(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

(29) Missouri
(001) Adair
(003) Andrew
(005) Atchison
(007) Audrain
(009) Barry
(011) Barton
(013) Bates
(015) Benton
(017) Bollinger
(019) Boone
(021) Buchanan
(023) Butler
(025) Caldwell
(027) Callaway
(029) Camden
(031) Cape Girardeau
(033) Carroll
(035) Carter
(037) Cass
(039) Cedar
(041) Chariton
(043) Christian
(045) Clark
(047) Clay
(049) Clinton
(051) Cole
(053) Cooper
(055) Crawford
(057) Dade
(059) Dallas
(061) Daviess
(063) De Kalb
(065) Dent
(067) Douglas
(069) Dunklin
(071) Franklin
(073) Gasconade
(075) Gentry
(077) Greene
(079) Grundy
(081) Harrison
(083) Henry
(085) Hickory
(087) Holt
(089) Howard
(091) Howell
(093) Iron
(095) Jackson
(097) Jasper
(099) Jefferson
(101) Johnson
(103) Knox
(105) Laclede
(107) Lafayette
(109) Lawrence
(111) Lewis
(113) Lincoln
(115) Linn
(117) Livingston
(119) McDonald
(121) Macon
(123) Madison
(125) Maries
(127) Marion
(129) Mercer
(131) Miller
(133) Mississippi
(135) Moniteau
(137) Monroe
(139) Montgomery
(141) Morgan
(143) New Madrid
(145) Newton
(147) Nodaway
(149) Oregon
(151) Osage
(153) Ozark
(155) Pemiscot
(157) Perry
(159) Pettis
(161) Phelps
(163) Pike
(165) Platte
(167) Polk
(169) Pulaski
(171) Putnam
(173) Ralls
(175) Randolph
(177) Ray
(179) Reynolds
(181) Ripley
(183) St. Charles
(185) St. Clair
(186) Ste. Genevieve
(187) St. Francois
(189) St. Louis
(195) Saline
(197) Schuyler
(199) Scotland
(201) Scott
(203) Shannon
(205) Shelby
(207) Stoddard
(209) Stone
(211) Sullivan
(213) Taney
(215) Texas
(217) Vernon
(219) Warren
(221) Washington
(223) Wayne
(225) Webster
(227) Worth
(229) Wright
(510) St. Louis City

(30) Montana
(001) Beaverhead
(003) Big Horn
(005) Blaine
(007) Broadwater
(009) Carbon

(011) Carter
(013) Cascade
(015) Chouteau
(017) Custer
(019) Daniels
(021) Dawson
(023) Deer Lodge
(025) Fallon
(027) Fergus
(029) Flathead
(031) Gallatin
(033) Garfield
(035) Glacier
(037) Golden Valley
(039) Granite
(041) Hill
(043) Jefferson
(045) Judith Basin
(047) Lake
(049) Lewis and Clark
(051) Liberty
(053) Lincoln
(055) McCone
(057) Madison
(059) Meagher
(061) Mineral
(063) Missoula
(065) Musselshell
(067) Park
(069) Petroleum
(071) Phillips
(073) Pondera
(075) Powder River
(077) Powell
(079) Prairie
(081) Ravalli
(083) Richland
(085) Roosevelt
(087) Rosebud
(089) Sanders
(091) Sheridan
(093) Silver Bow
(095) Stillwater
(097) Sweet Grass
(099) Teton
(101) Toole
(103) Treasure
(105) Valley
(107) Wheatland
(109) Wibaux
(111) Yellowstone
(113) Yellowstone National Park

(31) Nebraska
(001) Adams
(003) Antelope
(005) Arthur
(007) Banner
(009) Blaine
(011) Boone
(013) Box Butte
(015) Boyd
(017) Brown
(019) Buffalo
(021) Burt
(023) Butler
(025) Cass
(027) Cedar
(029) Chase
(031) Cherry
(033) Cheyenne
(035) Clay
(037) Colfax
(039) Cuming
(041) Custer
(043) Dakota
(045) Dawes
(047) Dawson
(049) Deuel
(051) Dixon
(053) Dodge
(055) Douglas
(057) Dundy
(059) Fillmore
(061) Franklin
(063) Frontier
(065) Furnas
(067) Gage
(069) Garden
(071) Garfield
(073) Gosper
(075) Grant
(077) Greeley
(079) Hall
(081) Hamilton
(083) Harlan
(085) Hayes
(087) Hitchcock
(089) Holt
(091) Hooker
(093) Howard
(095) Jefferson
(097) Johnson
(099) Kearney
(101) Keith
(103) Keya Paha
(105) Kimball
(107) Knox
(109) Lancaster
(111) Lincoln
(113) Logan
(115) Loup
(117) McPherson
(119) Madison
(121) Merrick
(123) Morrill
(125) Nance
(127) Nemaha
(129) Nuckolls
(131) Otoe
(133) Pawnee
(135) Perkins
(137) Phelps
(139) Pierce
(141) Platte
(143) Polk
(145) Red Willow
(147) Richardson
(149) Rock
(151) Saline
(153) Sarpy
(155) Saunders
(157) Scotts Bluff
(159) Seward
(161) Sheridan
(163) Sherman
(165) Sioux
(167) Stanton
(169) Thayer
(171) Thomas
(173) Thurston
(175) Valley
(177) Washington
(179) Wayne
(181) Webster
(183) Wheeler
(185) York

(32) Nevada
(001) Churchill
(003) Clark
(005) Douglas
(007) Elko
(009) Esmeralda
(011) Eureka
(013) Humboldt
(015) Lander
(017) Lincoln
(019) Lyon
(021) Mineral
(023) Nye
(027) Pershing
(029) Storey
(031) Washoe
(033) White Pine
(510) Carson City

(33) New Hampshire
(001) Belknap
(003) Carroll
(007) Coos
(005) Cheshire
(009) Grafton
(011) Hillsborough
(013) Merrimack
(015) Rockingham
(017) Strafford
(019) Sullivan

(34) New Jersey
(001) Atlantic
(003) Bergen
(005) Burlington
(007) Camden
(009) Cape May
(011) Cumberland
(013) Essex
(015) Gloucester
(017) Hudson
(019) Hunterdon
(021) Mercer
(023) Middlesex
(025) Monmouth
(027) Morris
(029) Ocean
(031) Passaic
(033) Salem
(035) Somerset
(037) Sussex
(039) Union
(041) Warren

(35) New Mexico
(001) Bernalillo
(003) Catron
(005) Chaves
(006) Cibola
(007) Colfax
(009) Curry
(011) De Baca
(013) Dona Ana
(015) Eddy
(017) Grant
(019) Guadalupe
(021) Harding
(023) Hidalgo
(025) Lea
(027) Lincoln
(028) Los Alamos
(029) Luna
(031) McKinley
(033) Mora
(035) Otero
(037) Quay
(039) Rio Arriba
(041) Roosevelt
(043) Sandoval
(045) San Juan
(047) San Miguel
(049) Santa Fe
(051) Sierra
(053) Socorro
(055) Taos
(057) Torrance
(059) Union
(061) Valencia

(36) New York
(001) Albany
(003) Allegany
(005) Bronx
(007) Broome
(009) Cattaraugus
(011) Cayuga
(013) Chautauqua
(015) Chemung
(017) Chenango
(019) Clinton
(021) Columbia
(023) Cortland
(025) Delaware
(027) Dutchess
(029) Erie
(031) Essex
(033) Franklin
(035) Fulton
(037) Genesee
(039) Greene
(041) Hamilton
(043) Herkimer
(045) Jefferson
(047) Kings
(049) Lewis
(051) Livingston
(053) Madison
(055) Monroe
(057) Montgomery
(059) Nassau
(061) New York
(063) Niagara
(065) Oneida
(067) Onondaga
(069) Ontario
(071) Orange
(073) Orleans
(075) Oswego
(077) Otsego
(079) Putnam
(081) Queens
(083) Rensselaer
(085) Richmond
(087) Rockland
(089) St. Lawrence
(091) Saratoga
(093) Schenectady
(095) Schoharie
(097) Schuyler
(099) Seneca
(101) Steuben
(103) Suffolk
(105) Sullivan
(107) Tioga
(109) Tompkins
(111) Ulster
(113) Warren
(115) Washington
(117) Wayne
(119) Westchester
(121) Wyoming
(123) Yates

(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

(38) North Dakota
(001) Adams
(003) Barnes
(005) Benson
(007) Billings
(009) Bottineau
(011) Bowman
(013) Burke
(015) Burleigh
(017) Cass
(019) Cavalier
(021) Dickey
(023) Divide
(025) Dunn
(027) Eddy
(029) Emmons
(031) Foster
(033) Golden Valley
(035) Grand Forks
(037) Grant
(039) Griggs
(041) Hettinger
(043) Kidder
(045) La Moure
(047) Logan
(049) McHenry
(051) McIntosh
(053) McKenzie
(055) McLean
(057) Mercer
(059) Morton
(061) Mountrial
(063) Nelson
(065) Oliver
(067) Pembina
(069) Pierce
(071) Ramsey
(073) Ransom
(075) Renville
(077) Richland
(079) Rolette
(081) Sargent
(083) Sheridan
(085) Sioux
(087) Slope
(089) Stark
(091) Steele
(093) Stutsman
(095) Towner
(097) Traill
(099) Walsh
(101) Ward
(103) Wells
(105) Williams

(39) Ohio
(001) Adams
(003) Allen
(005) Ashland
(007) Ashtabula
(009) Athens
(011) Auglaize
(013) Belmont
(015) Brown
(017) Butler
(019) Carroll
(021) Champaign
(023) Clark
(025) Clermont
(027) Clinton
(029) Columbiana
(031) Coshocton
(033) Crawford
(035) Cuyahoga
(037) Darke
(039) Defiance
(041) Delaware
(043) Erie
(045) Fairfield
(047) Fayette
(049) Franklin
(051) Fulton
(053) Gallia
(055) Geauga
(057) Greene
(059) Guernsey
(061) Hamilton
(063) Hancock
(065) Hardin
(067) Harrison
(069) Henry
(071) Highland
(073) Hocking
(075) Holmes
(077) Huron
(079) Jackson
(081) Jefferson
(083) Knox
(085) Lake
(087) Lawrence

(089) Licking
(091) Logan
(093) Lorain
(095) Lucas
(097) Madison
(099) Mahoning
(101) Marion
(103) Medina
(105) Meigs
(107) Mercer
(109) Miami
(111) Monroe
(113) Montgomery
(115) Morgan
(117) Morrow
(119) Muskingum
(121) Noble
(123) Ottawa
(125) Paulding
(127) Perry
(129) Pickaway
(131) Pike
(133) Portage
(135) Preble
(137) Putnam
(139) Richland
(141) Ross
(143) Sandusky
(145) Scioto
(147) Seneca
(149) Shelby
(151) Stark
(153) Summit
(155) Trumbull
(157) Tuscarawas
(159) Union
(161) Van Wert
(163) Vinton
(165) Warren
(167) Washington
(169) Wayne
(171) Williams
(173) Wood
(175) Wyandot

(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

(41) Oregon
(001) Baker
(003) Benton
(005) Clackamas
(007) Clatsop
(009) Columbia
(011) Coos
(013) Crook
(015) Curry
(017) Deschutes
(019) Douglas
(021) Gilliam
(023) Grant
(025) Harney
(027) Hood River
(029) Jackson
(031) Jefferson
(033) Josephine
(035) Klamath
(037) Lake
(039) Lane
(041) Lincoln
(043) Linn
(045) Malheur
(047) Marion
(049) Morrow
(051) Multnomah
(053) Polk
(055) Sherman
(057) Tillamook
(059) Umatilla
(061) Union
(063) Wallowa
(065) Wasco
(067) Washington
(069) Wheeler
(071) Yamhill

(42) Pennsylvania
(001) Adams
(003) Allegheny
(005) Armstrong
(007) Beaver
(009) Bedford

(011) Berks
(013) Blair
(015) Bradford
(017) Bucks
(019) Butler
(021) Cambria
(023) Cameron
(025) Carbon
(027) Centre
(029) Chester
(031) Clarion
(033) Clearfield
(035) Clinton
(037) Columbia
(039) Crawford
(041) Cumberland
(043) Dauphin
(045) Delaware
(047) Elk
(049) Erie
(051) Fayette
(053) Forest
(055) Franklin
(057) Fulton
(059) Greene
(061) Huntingdon
(063) Indiana
(065) Jefferson
(067) Juniata
(069) Lackawanna
(071) Lancaster
(073) Lawrence
(075) Lebanon
(077) Lehigh
(079) Luzerne
(081) Lycoming
(083) McKean
(085) Mercer
(087) Mifflin
(089) Monroe
(091) Montgomery
(093) Montour
(095) Northampton
(097) Northumberland
(099) Perry
(101) Philadelphia
(103) Pike
(105) Potter
(107) Schuylkill
(109) Snyder
(111) Somerset
(113) Sullivan
(115) Susquehanna
(117) Tioga
(119) Union
(121) Venango
(123) Warren
(125) Washington
(127) Wayne
(129) Westmoreland
(131) Wyoming
(133) York
(447) Elk-Anf
(453) Forest-Anf
(483) McKean-Anf
(523) Warren-Anf

(44) Rhode Island
(001) Bristol
(003) Kent
(005) Newport
(007) Providence
(009) Washington

(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

(46) South Dakota
(003) Aurora
(005) Beadle
(007) Bennett
(009) Bon Homme
(011) Brookings
(013) Brown
(015) Brule
(017) Buffalo
(019) Butte
(021) Campbell
(023) Charles Mix
(025) Clark
(027) Clay
(029) Codington
(031) Corson
(033) Custer
(035) Davison
(037) Day
(039) Deuel
(041) Dewey
(043) Douglas
(045) Edmunds
(047) Fall River
(049) Faulk
(051) Grant
(053) Gregory
(055) Haakon
(057) Hamlin
(059) Hand
(061) Hanson
(063) Harding
(065) Hughes
(067) Hutchinson
(069) Hyde
(071) Jackson
(073) Jerauld
(075) Jones
(077) Kingsbury
(079) Lake
(081) Lawrence
(083) Lincoln
(085) Lyman
(087) McCook
(089) McPherson
(091) Marshall

(093) Meade
(095) Mellette
(097) Miner
(099) Minnehaha
(101) Moody
(103) Pennington
(105) Perkins
(107) Potter
(109) Roberts
(111) Sanborn
(113) Shannon
(115) Spink
(117) Stanley
(119) Sully
(121) Todd
(123) Tripp
(125) Turner
(127) Union
(129) Walworth
(135 Yankton
(137) Ziebach

(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

(48) Texas
(001) Anderson
(003) Andrews
(005) Angelina
(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
(037) Bowie
(039) Brazoria
(041) Brazos
(043) Brewster
(045) Briscoe
(047) Brooks
(049) Brown
(051) Burleston
(053) Burnet
(055) Caldwell
(057) Calhoun
(059) Callahan
(061) Cameron
(063) Camp
(065) Carson
(067) Cass
(069) Castro
(071) Chambers
(073) Cherokee
(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
(159) Franklin
(161) Freestone
(163) Frio
(165) Gaines
(167) Galveston
(169) Garza
(171) Gillespie
(173) Glasscock
(175) Goliad
(177) Gonzales
(179) Gray
(181) Grayson
(183) Gregg
(185) Grimes
(187) Guadalupe
(189) Hale
(191) Hall
(193) Hamilton
(195) Hansford
(197) Hardeman
(199) Hardin
(201) Harris
(203) Harrison
(205) Hartley
(207) Haskell
(209) Hays
(211) Hemphill
(213) Henderson
(215) Hidalgo
(217) Hill
(219) Hockley
(221) Hood
(223) Hopkins
(225) Houston
(227) Howard
(229) Hudspeth
(231) Hunt
(233) Hutchinson
(235) Irion
(237) Jack
(239) Jackson
(241) Jasper
(243) Jeff Davis
(245) Jefferson
(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
(289) Leon
(291) Liberty
(293) Limestone
(295) Lipscomb
(297) Live Oak
(299) Llano
(301) Loving
(303) Lubbock
(305) Lynn
(307) McCulloch
(309) McLennan
(311) McMullen
(313) Madison
(315) Marion
(317) Martin
(319) Mason
(321) Matagorda
(323) Maverick
(325) Medina
(327) Menard
(329) Midland
(331) Milam
(333) Mills
(335) Mitchell
(337) Montague
(339) Montgomery
(341) Moore
(343) Morris
(345) Motley
(347) Nacogdoches
(349) Navarro
(351) Newton
(353) Nolan
(355) Nueces
(357) Ochiltree
(359) Oldham
(361) Orange
(363) Palo Pinto
(365) Panola
(367) Parker
(369) Parmer
(371) Pecos
(373) Polk
(375) Potter
(377) Presidio
(379) Rains
(381) Randall
(383) Reagan
(385) Real
(387) Red River
(389) Reeves
(391) Refugio
(393) Roberts
(395) Robertson
(397) Rockwall
(399) Runnels
(401) Rusk
(403) Sabine
(405) San Augustine
(407) San Jacinto
(409) San Patricio
(411) San Saba
(413) Schleicher
(415) Scurry
(417) Shackelford
(419) Shelby
(421) Sherman
(423) Smith
(425) Somervell
(427) Starr
(429) Stephens
(431) Sterling

(433) Stonewall
(435) Sutton
(437) Swisher
(439) Tarrant
(441) Taylor
(443) Terrell
(445) Terry
(447) Throckmorton
(449) Titus
(451) Tom Green
(453) Travis
(455) Trinity
(457) Tyler
(459) Upshur
(461) Upton
(463) Uvalde
(465) Val Verde
(467) Van Zandt
(469) Victoria
(471) Walker
(473) Waller
(475) Ward
(477) Washington
(479) Webb
(481) Wharton
(483) Wheeler
(485) Wichita
(487) Wilbarger
(489) Willacy
(491) Williamson
(493) Wilson
(495) Winkler
(497) Wise
(499) Wood
(501) Yoakum
(503) Young
(505) Zapata
(507) Zavala

(49) Utah
(001) Beaver
(003) Box Elder
(005) Cache
(007) Carbon
(009) Daggett
(011) Davis
(013) Duchesne
(015) Emery
(017) Garfield
(019) Grand
(021) Iron
(023) Juab
(025) Kane
(027) Millard
(029) Morgan
(031) Piute
(033) Rich
(035) Salt Lake
(037) San Juan
(039) Sanpete
(041) Sevier
(043) Summit
(045) Tooele
(047) Uintah
(049) Utah
(051) Wasatch
(053) Washington
(055) Wayne
(057) Weber

(50) Vermont
(001) Addison
(003) Bennington
(005) Caledonia
(007) Chittenden
(009) Essex
(011) Franklin
(013) Grand Isle
(015) Lamoille
(017) Orange
(019) Orleans
(021) Rutland
(023) Washington
(025) Windham
(027) Windsor

(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
(510) Alexandria City
(515) Bedford City
(520) Bristol City
(530) Buena Vista City
(540) Charlottesville City
(550) Chesapeake City
(560) Clifton Gorge City
(570) Colonial Heights City
(580) Covington City
(590) Danville City
(595) Emporia City
(600) Fairfax City
(610) Falls Church City
(620) Franklin City
(630) Fredericksburg City
(640) Galax City
(650) Hampton City
(660) Harrisonburg City
(670) Hopewell City
(678) Lexington City
(680) Lynchburg City
(683) Manassas City
(685) Manassas Park
(690) Martinsville City
(700) Newport News City
(710) Norfolk City
(720) Norton City
(730) Petersburg City
(735) Poquoson
(740) Portsmouth City
(750) Radford City
(760) Richmond City
(770) Roanoke City
(775) Salem City
(780) South Boston City
(790) Staunton City
(800) Suffolk City
(810) Virginia Beach City
(820) Waynesboro City
(830) Williamsburg City
(840) Winchester City

(53) Washington
(001) Adams
(003) Asotin
(005) Benton
(007) Chelan
(009) Clallam
(011) Clark
(013) Columbia
(015) Cowlitz
(017) Douglas
(019) Ferry
(021) Franklin
(023) Garfield
(025) Grant
(027) Grays Harbor
(029) Island
(031) Jefferson
(033) King
(035) Kitsap
(037) Kittitas
(039) Klickitat
(041) Lewis
(043) Lincoln
(045) Mason
(047) Okanogan
(049) Pacific
(051) Pend Oreille
(053) Pierce
(055) San Juan
(057) Skagit
(059) Skamania
(061) Snohomish
(063) Spokane
(065) Stevens
(067) Thurston
(069) Wahkiakum
(071) Walla Walla
(073) Whatcom
(075) Whitman
(077) Yakima

(54) West Virginia
(001) Barbour
(003) Berkeley
(005) Boone
(007) Braxton
(009) Brooke
(011) Cabell
(013) Calhoun
(015) Clay
(017) Doddridge
(019) Fayette
(021) Gilmer
(023) Grant
(025) Greenbriar
(027) Hampshire
(029) Hancock
(031) Hardy
(033) Harrison
(035) Jackson
(037) Jefferson
(039) Kanawha
(041) Lewis
(043) Lincoln
(045) Logan
(049) Marion
(051) Marshall
(053) Mason
(047) McDowell
(055) Mercer
(057) Mineral
(059) Mingo
(065) Morgan
(061) Monongalia
(063) Monroe
(067) Nicholas
(069) Ohio
(071) Pendleton
(073) Pleasant
(075) Pocahontas
(077) Preston
(079) Putnam
(081) Raleigh
(083) Randolph
(085) Ritchie
(087) Roane
(089) Summers
(091) Taylor
(093) Tucker
(095) Tyler
(097) Upshur
(099) Wayne
(101) Webster
(103) Wetzel
(105) Wirt
(107) Wood
(109) Wyoming

(55) Wisconsin
(001) Adams
(003) Ashland
(005) Barron
(007) Bayfield
(009) Brown
(011) Buffalo
(013) Burnett
(015) Calumet
(017) Chippewa
(019) Clark
(021) Columbia
(023) Crawford
(025) Dane

(027) Dodge
(029) Door
(031) Douglas
(033) Dunn
(035) Eau Claire
(037) Florence
(039) Fond du Lac
(041) Forest
(043) Grant
(045) Green
(047) Green Lake
(049) Iowa
(051) Iron
(053) Jackson
(055) Jefferson
(057) Juneau
(059) Kenosha
(061) Kewaunee
(063) La Crosse
(065) Lafayette
(067) Langlade
(069) Lincoln
(071) Manitowoc
(073) Marathon
(075) Marinette
(077) Marquette
(078) Menominee
(079) Milwaukee
(081) Monroe
(083) Oconto
(085) Oneida
(087) Outagamie
(089) Ozaukee
(091) Pepin
(093) Pierce
(095) Polk
(097) Portage
(099) Price
(101) Racine
(103) Richland
(105) Rock
(107) Rusk
(109) St. Croix
(111) Sauk
(113) Sawyer
(115) Shawano
(117) Sheboygan
(119) Taylor
(121) Trempealeau
(123) Vernon
(125) Vilas
(127) Walworth
(129) Washburn
(131) Washington
(133) Waukesha
(135) Waupaca
(137) Waushara
(139) Winnebago
(141) Wood

(56) Wyoming
(001) Albany
(003) Big Horn
(005) Campbell
(007) Carbon
(009) Converse
(011) Crook
(013) Fremont
(015) Goshen
(017) Hot Springs
(019) Johnson
(021) Laramie
(023) Lincoln
(025) Natrona
(027) Niobrara
(029) Park
(031) Platte
(033) Sheridan
(035) Sublette
(037) Sweetwater
(039) Teton
(041) Uinta
(043) Washakie
(045) Weston

(72) Puerto Rico
(001) Adjuntas
(003) Aguada
(005) Aguadilla
(007) Aguas Buenas
(009) Aibonito
(011) Anasco
(013) Arecibo
(015) Arroyo
(017) Barceloneta
(019) Barranquitas
(021) Bayamon
(023) Cabo Rojo
(025) Caguas
(027) Camuy
(029) Canovanas
(031) Carolina
(033) Catano
(035) Cayey
(037) Ceiba
(039) Ciales
(041) Cidra
(043) Coamo
(045) Comerio
(047) Corozal
(049) Culebra
(051) Dorado
(053) Fajardo
(054) Florida
(055) Guanica
(057) Guayama
(059) Guayanilla
(061) Guaynabo
(063) Gurabo
(065) Hatillo
(067) Hormigueros
(069) Humacao
(071) Isabela Municipio
(073) Jayuya
(075) Juana Diaz
(077) Juncos
(079) Lajas
(081) Lares
(083) Las Marias
(085) Las Piedras
(087) Loiza
(089) Luquillo
(091) Manati
(093) Maricao
(095) Maunabo
(097) Mayaguez
(099) Moca
(101) Morovis
(103) Naguabo
(105) Naranjito
(107) Orocovis
(109) Patillas
(111) Penuelas
(113) Ponce
(115) Quebradillas
(117) Rincon
(119) Rio Grande
(121) Sabana Grande
(123) Salinas
(125) San German
(127) San Juan
(129) San Lorenzo
(131) San Sebastian
(133) Santa Isabel
(135) Toa Alta
(137) Toa Baja
(139) Trujillo Alto
(141) Utuado
(143) Vega Alta
(145) Vega Baja
(147) Vieques
(149) Villalba
(151) Yabucoa
(153) Yuaco

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

Appendix 2. FIA Forest Type Codes

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

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

East	West	Code	Species Type
	W	203	Bigcone Douglas-fir
			Ponderosa Pine Group
E	W	221	Ponderosa pine
	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

East	West	Code	Species Type
			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
			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

East	West	Code	Species Type
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
			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 and Subtropical Hardwoods Groups
E		982	Mangrove swamps

East	West	Code	Species Type
E	W	983	Palms
		984	Dry forest
		985	Moist forest
		986	Wet and rain forest
		987	Lower montane rainforest
E		989	Other tropical and subtropical 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), then the forest type will be one of the softwood types (codes 101 through 391) and vice versa for hardwoods (codes 401 through 995).

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

LONGLEAF/SLASH PINE GROUP

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

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

TROPICAL SOFTWOODS GROUP

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

LOBLOLLY/SHORTLEAF PINE GROUP

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

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

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

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

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

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

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

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

OTHER EASTERN SOFTWOODS GROUP

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

172 Florida softwoods (includes either Florida yew or Florida 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

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.

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.

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.

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.

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.

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.

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 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 AND SUBTROPICAL HARDWOODS GROUPS

982 Mangrove swamps: 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.

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

989 Other tropical and subtopical 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.

Appendix 3. FIA Tree Species Codes

This list includes all tree species tallied in the Continental U.S., Alaska, and the Caribbean. Species designated East/West/Caribbean 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	Carib bean	Wood land	FIA Code	PLANTS Code	Common Name	Common name NRS	Common name SRS	Common name RMRS	Common name PNWRS	Common name Caribbean	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				Santa Lucia 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				Baker cypress		Cupressus	bakeri
X		W			0053	CUFO2	tecate cypress						Cupressus	forbesii

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X		W			0054	CUMA2	Monterey cypress						Cupressus	macrocarpa
		W			0055	CUSA3	Sargent's cypress						Cupressus	sargentii
X		W			0056	CUMA	MacNab's cypress						Cupressus	macnabiana
	E	W			0057	JUNIP	redcedar, juniper spp.						Juniperus	spp.
X		W		w	0058	JUPI	Pinchot juniper						Juniperus	pinchotii
X		W		w	0059	JUCO11	redberry juniper						Juniperus	coahuilensis
	E			w	0060	JUFL	drooping juniper						Juniperus	flaccida
X	E			w	0061	JUAS	Ashe juniper						Juniperus	ashei
X		W		w	0062	JUCA7	California juniper						Juniperus	californica
X		W		w	0063	JUDE2	alligator juniper						Juniperus	deppeana
X		W			0064	JUOC	western juniper						Juniperus	occidentalis
X		W		w	0065	JUOS	Utah juniper						Juniperus	osteosperma
X	E	W		w	0066	JUSC2	Rocky Mountain juniper						Juniperus	scopulorum
	E				0067	JUVIS	southern redcedar						Juniperus	virginiana var. silicicola
X	E				0068	JUVI	eastern redcedar						Juniperus	virginiana
X		W		w	0069	JUMO	oneseed juniper						Juniperus	monosperma
	E	W			0070	LARIX	larch spp.						Larix	spp.
X	E	W			0071	LALA	tamarack (native)						Larix	laricina
X		W			0072	LALY	subalpine larch						Larix	lyallii
X		W			0073	LAOC	western larch						Larix	occidentalis
X		W			0081	CADE27	incense-cedar						Calocedrus	decurrens
	E	W			0090	PICEA	spruce spp.						Picea	spp.
X	E				0091	PIAB	Norway spruce						Picea	abies
X		W			0092	PIBR	Brewer spruce						Picea	breweriana
X		W			0093	PIEN	Engelmann spruce						Picea	engelmannii

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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	attenuata
X		W			0104	PIBA	foxtail pine						Pinus	balfouriana
X	E				0105	PIBA2	jack pine						Pinus	banksiana
X		W		w	0106	PIED	Common pinyon, two-needle pinyon				common 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

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X		W			0119	PIMO3	western white pine						Pinus	monticola
X		W			0120	PIMU	bishop pine						Pinus	muricata
X	E				0121	PIPA2	longleaf pine						Pinus	palustris
X	E	W			0122	PIPO	ponderosa pine						Pinus	ponderosa
X	E				0123	PIPU5	Table Mountain pine						Pinus	pungens
X		W			0124	PIRA2	Monterey pine						Pinus	radiata
X	E				0125	PIRE	red pine						Pinus	resinosa
X	E				0126	PIRI	pitch pine						Pinus	rigida
X		W			0127	PISA2	gray pine, California foothill pine				gray pine		Pinus	sabiniana
X	E				0128	PISE	pond pine						Pinus	serotina
X	E				0129	PIST	eastern white pine						Pinus	strobus
X	E	W			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		w	0138	PIQU	four-leaf pine, Parry pinyon pine				four-leaf pine		Pinus	quadrifolia
X		W			0139	PITO	Torrey pine				torreya pine		Pinus	torreyana
X		W		w	0140	PICE	Mexican pinyon pine						Pinus	cembroides
	E			w	0141	PIRE5	papershell pinyon pine						Pinus	remota

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X		W			0142	PILO	Great Basin bristlecone pine						Pinus	longaeva
X		W		w	0143	PIMOF	Arizona pinyon pine						Pinus	monophylla var. fallax
X	E				0144	PIELE2	Caribbean pine						Pinus	elliottii var. elliottii
		W			0200	PSEUD7	Douglas-fir spp.						Pseudotsuga	spp.
X		W			0201	PSMA	bigcone Douglas-fir						Pseudotsuga	macrocarpa
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

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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	C	w	0300	ACACI	acacia spp.						Acacia	spp.
	E	W	C	w	0303	ACFA	sweet acacia						Acacia	farnesiana
	E	W		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

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	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	W			0341	AIAL	ailanthus						Ailanthus	altissima
X	E	W			0345	ALJU	mimosa/silktree						Albizia	julibrissin
		W			0350	ALNUS	alder spp.						Alnus	spp.
X		W			0351	ALRU2	red alder						Alnus	rubra
X		W			0352	ALRH2	white alder						Alnus	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	W			0374	BEOC2	water birch						Betula	occidentalis
X	E	W			0375	BEPA	paper birch						Betula	papyrifera
X	E				0377	BEUB	Virginia roundleaf birch						Betula	uber

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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

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		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
		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

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	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				Tasmanian bluegum, eucalyptus		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.

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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	HAPA2	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
X	E	W			0602	JUNI	black walnut						Juglans	nigra
		W			0603	JUHI	Northern California black walnut				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

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X	E				0654	MAMA2	bigleaf magnolia						Magnolia	macrophylla
X	E				0655	MAFR	mountain magnolia, Fraser magnolia				mountain 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				Oregon crab apple		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

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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
X		W			0747	POBAT	black cottonwood						Populus	balsamifera ssp. trichocarpa
X		W			0748	POFR2	Fremont's cottonwood			Rio Grande cottonwood, Fremont's poplar			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	C	w	0755	PROSO	mesquite spp.						Prosopis	spp.
X	E	W		w	0756	PRGL2	honey mesquite			western honey mesquite	western honey mesquite		Prosopis	glandulosa
X	E	W		w	0757	PRVE	velvet mesquite						Prosopis	velutina

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X	E	W		w	0758	PRPU	screwbean mesquite						Prosopis	pubescens
	E	W	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				chokecherry		Prunus	virginiana
	E				0764	PRPE3	peach						Prunus	persica
X	E				0765	PRNI	Canada plum						Prunus	nigra
X	E				0766	PRAM	American plum				wild 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 spp.						Quercus	spp.
X		W			0801	QUAG	California live oak				coast live oak		Quercus	agrifolia
X	E				0802	QUAL	white oak						Quercus	alba
X		W		w	0803	QUAR	Arizona white oak				Arizona white and gray 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

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X		W			0807	QUDO	blue oak						Quercus	douglasii
X	E				0808	QUSIS	Durand oak						Quercus	sinuata var. sinuata
X	E				0809	QUEL	northern pin oak						Quercus	ellipsoidalis
X		W		w	0810	QUEM	Emory oak						Quercus	emoryi
X		W			0811	QUEN	Engelmann oak						Quercus	engelmannii
X	E				0812	QUFA	southern red oak						Quercus	falcata
X	E				0813	QUPA5	cherrybark oak						Quercus	pagoda
X		W		w	0814	QUGA	Gambel oak						Quercus	gambelii
X		W			0815	QUGA4	Oregon white oak						Quercus	garryana
X	E				0816	QUIL	scrub oak						Quercus	ilicifolia
X	E				0817	QUIM	shingle oak						Quercus	imbricaria
X		W			0818	QUKE	California black oak						Quercus	kelloggii
X	E				0819	QULA2	turkey oak						Quercus	laevis
X	E				0820	QULA3	laurel oak						Quercus	laurifolia
X		W			0821	QULO	California white oak						Quercus	lobata
X	E				0822	QULY	overcup oak						Quercus	lyrata
X	E				0823	QUMA2	bur oak						Quercus	macrocarpa
X	E				0824	QUMA3	blackjack oak						Quercus	marilandica
X	E				0825	QUMI	swamp chestnut oak						Quercus	michauxii
X	E				0826	QUMU	chinkapin oak						Quercus	muehlenbergii
X	E				0827	QUNI	water oak						Quercus	nigra
X	E				0828	QUTE	Nuttall oak, Texas red oak						Quercus	texana
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

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X	E				0832	QUPR2	chestnut oak						Quercus	prinus
X	E				0833	QURU	northern red oak						Quercus	rubra
X	E				0834	QUSH	Shumard's oak				Shumard 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					sea torch-wood	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.

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X	E		C		0856	CAGL11	gray sheoak						Casuarina	glauca
X	E		C		0857	CALE28	Australian pine					Casuarina lepidophloia	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					tietongue	Coccoloba	diversifolia
	E		C		0864	COEL2	soldierwood						Colubrina	elliptica
	E		C		0865	COSE2	geiger tree					largeleaf geigertree	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					butterbough	Exothea	paniculata
	E				0876	FIAU	strangler fig						Ficus	aurea
	E		C		0877	FICI	shortleaf fig, wild banyantree					wild banyantree	Ficus	citrifolia
	E		C		0882	GUDI	Blolly, beeftree					beeftree	Guapira	discolor
	E		C		0883	HIMA2	manchineel						Hippomane	mancinella
	E		C		0884	LYLA3	false tamarind						Lysiloma	latisiliquum
	E		C		0885	MAIN3	mango						Mangifera	indica
	E		C		0886	METO3	poisonwood					Florida poisontree	Metopium	toxiferum

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	E				0887	PIPI3	fishpoison tree						Piscidia	piscipula
	E		C		0888	SCAC2	schefflera, octopus tree					schefflera actinophylla	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

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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

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X		W			0981	UMCA	California laurel						Umbellularia	californica
		W			0982	YUBR	Joshua tree						Yucca	brevifolia
	E		C		0986	AVGE	black mangrove						Avicennia	germinans
	E		C		0987	COER2	buttonwood mangrove					button mangrove	Conocarpus	erectus
	E		C		0988	LARA2	white mangrove						Laguncularia	racemosa
X	E		C		0989	RHMA2	American mangrove					red mangrove	Rhizophora	mangle
		W		w	0990	OLTE	desert ironwood				tesota, Arizona-ironwood		Olneya	tesota
	E	W	C		0991	TAMAR2	saltcedar						Tamarix	spp.
X	E		C		0992	MEQU	melaleuca					punktree	Melaleuca	quinquenervia
X	E		C		0993	MEAZ	chinaberry					Chinaberry-tree	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
			C		6001	ACAN4	blackbrush wattle						Acacia	anegadensis
			C		6008	ACMA	porknut						Acacia	macracantha
			C		6009	ACMA12	Acacia mangium						Acacia	mangium
			C		6012	ACMU	spineless wattle						Acacia	muricata
			C		6013	ACNI2	gum arabic tree						Acacia	nilotica
			C		6015	ACPO3	Acacia polyacantha						Acacia	polyacantha
			C		6018	ACTO	poponax						Acacia	tortuosa
			C		6021	ACAR	hollowheart						Acnistus	arborescens

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			C		6023	ACME2	grugru palm						Acrocomia	media
			C		6025	ADDI3	baobab						Adansonia	digitata
			C		6026	ADRI	wild lime						Adelia	ricinella
			C		6028	ADPA	red beadtree						Adenanthera	pavonina
			C		6032	AEMA	Caribbean spiritweed						Aegiphila	martinicensis
			C		6036	AGAU4	kauri						Agathis	australis
			C		6037	AGRO6	Queensland kauri						Agathis	robusta
			C		6053	AIMI	Aiphanes minima						Aiphanes	minima
			C		6055	ALAD	cream albizia						Albizia	adinocephala
			C		6056	ALCA8	naked albizia						Albizia	carbonaria
			C		6059	ALLE	woman's tongue						Albizia	lebbeck
			C		6060	ALPR	tall albizia						Albizia	procera
			C		6064	ALLA	achiotillo						Alchornea	latifolia
			C		6066	ALFL3	palo de gallina						Alchorneopsis	floribunda
			C		6075	ALMO2	Indian walnut						Aleurites	moluccana
			C		6080	ALCR9	palo blanco						Allophylus	crassinervis
			C		6082	ALRA	palo de caja						Allophylus	racemosus
			C		6092	ALBR4	helecho gigante de la sierra						Alsophila	bryophila
			C		6093	ALPO7	Alsophila portoricensis						Alsophila	portoricensis
			C		6101	AMLA4	black calabash						Amphitecna	latifolia
			C		6103	AMBA2	balsam torchwood						Amyris	balsamifera
			C		6106	ANACA	anacardium						Anacardium	spp.
			C		6107	ANOC	cashew						Anacardium	occidentale
			C		6111	ANPE13	Anadenanthera peregrina						Anadenanthera	peregrina
			C		6114	ANIN	cabbagebark tree						Andira	inermis

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			C		6120	ANBR7	canelillo						Aniba	bracteata
			C		6124	ANCH9	Annona cherimola						Annona	cherimola
			C		6125	ANDI11	ilama						Annona	diversifolia
			C		6127	ANMO	mountain soursop						Annona	montana
			C		6128	ANMU2	soursop						Annona	muricata
			C		6129	ANRE	custard apple						Annona	reticulata
			C		6131	ANSQ	sugar apple						Annona	squamosa
			C		6137	ANBU3	Antidesma bunius						Antidesma	bunius
			C		6146	ANAC4	placa chiquitu						Antirhea	acutata
			C		6147	ANCO3	pegwood						Antirhea	coriacea
			C		6149	ANLU3	palo iloron						Antirhea	lucida
			C		6150	ANOB2	quina roja						Antirhea	obtusifolia
			C		6151	ANPO3	Puerto Rico quina						Antirhea	portoricensis
			C		6152	ANSI	Sintenis' quina						Antirhea	sintenisii
			C		6154	ARAN15	parana pine						Araucaria	angustifolia
			C		6157	ARHE12	Norfolk Island pine						Araucaria	heterophylla
			C		6162	ARGL11	ausubon						Ardisia	glauciflora
			C		6163	ARLU3	mountain marlberry						Ardisia	luquillensis
			C		6164	AROB2	Guadeloupe marlberry						Ardisia	obovata
			C		6165	ARSO	China-shrub						Ardisia	solanacea
			C		6171	ARAL7	breadfruit						Artocarpus	altilis
			C		6173	ARHE2	Artocarpus heterophyllus						Artocarpus	heterophyllus
			C		6198	AVCA	carambola						Averrhoa	carambola
			C		6206	AZIN2	neem						Azadirachta	indica
			C		6216	BAVU2	common bamboo						Bambusa	vulgaris

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			C		6217	BAPO	Puerto Rico palo de ramon						Banara	portoricensis
			C		6219	BAVA2	Vanderbilt's palo de ramon						Banara	vanderbiltii
			C		6220	BAAS3	sea putat						Barringtonia	asiatica
			C		6224	BAEG6	Bastardiopsis eggersii						Bastardiopsis	eggersii
			C		6226	BAMO2	Napoleon's plume						Bauhinia	monandra
			C		6227	BAMU3	petite flamboyant bauhinia						Bauhinia	multinervia
			C		6228	BAPA3	railroadfence						Bauhinia	pauletia
			C		6229	BAPU	butterfly tree						Bauhinia	purpurea
			C		6231	BATO	St. Thomas tree						Bauhinia	tomentosa
			C		6232	BAVA	mountain ebony						Bauhinia	variegata
			C		6233	BEPE	slugwood						Beilschmiedia	pendula
			C		6235	BEDI2	Caribbean myrtlecroton						Bernardia	dichotoma
			C		6238	BIOR	lipsticktree						Bixa	orellana
			C		6240	BLSA2	akee						Blighia	sapida
			C		6247	BOFR2	parrotweed						Bocconia	frutescens
			C		6251	BODA	white alling						Bontia	daphnoides
			C		6253	BORA2	Bourreria radula						Bourreria	radula
			C		6255	BOSU2	bodywood						Bourreria	succulenta
			C		6257	BOVI2	roble de guayo						Bourreria	virgata
			C		6270	BRCO6	West Indian sumac						Brunellia	comocladiifolia
			C		6272	BRAM4	American brunfelsia						Brunfelsia	americana
			C		6273	BRDE4	Serpentine Hill raintree						Brunfelsia	densifolia
			C		6274	BRLA5	vega blanca						Brunfelsia	lactea
			C		6275	BRPO3	Puerto Rico raintree						Brunfelsia	portoricensis

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			C		6283	BUTE4	fourleaf buchenavia						Buchenavia	tetraphylla
			C		6284	BUBU	gregorywood						Bucida	buceras
			C		6294	BUGL2	cafe falso						Bunchosia	glandulifera
			C		6295	BUGL	cafe forastero						Bunchosia	glandulosa
			C		6297	BUPO5	Bunchosia polystachia						Bunchosia	polystachia
			C		6303	BULA10	Buxus laevigata						Buxus	laevigata
			C		6304	BUPO	Puerto Rico box						Buxus	portoricensis
			C		6306	BUVA	Vahl's box						Buxus	vahlii
			C		6308	BYCR	maricao cimun						Byrsonima	crassifolia
			C		6311	BYLU	Long Key locustberry						Byrsonima	lucida
			C		6313	BYSP	doncella						Byrsonima	spicata
			C		6315	BYWA	almendrillo						Byrsonima	wadsworthii
			C		6316	CAESA	nicker						Caesalpinia	spp.
			C		6317	CACO28	divi divi						Caesalpinia	coriaria
			C		6319	CAPU13	pride-of-Barbados						Caesalpinia	pulcherrima
			C		6320	CASA28	sappanwood						Caesalpinia	sappan
			C		6325	CASU33	Surinamese stickpea						Calliandra	surinamensis
			C		6326	CAAM14	caparosa						Callicarpa	ampla
			C		6328	CACI15	crimson bottlebrush						Callistemon	citrinus
			C		6331	CACO2	Callitris columellaris						Callitris	columellaris
			C		6337	CAEC2	Caloncoba echinata						Caloncoba	echinata
			C		6338	CAAN22	Antilles calophyllum						Calophyllum	antillanum
			C		6341	CAIN4	Alexandrian laurel						Calophyllum	inophyllum
			C		6346	CAPR	roostertree						Calotropis	procera
			C		6350	CACA73	degame						Calycophyllum	candidissimum

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			C		6351	CAKI	Kiaerskov's lidflower						Calyptranthes	kiaerskovii
			C		6352	CAKR	limoncillo						Calyptranthes	krugii
			C		6353	CALU12	Luquillo forest lidflower						Calyptranthes	luquillensis
			C		6354	CAPA8	pale lidflower						Calyptranthes	pallens
			C		6355	CAPO9	Puerto Rico lidflower						Calyptranthes	portoricensis
			C		6356	CASI8	limoncillo de monte						Calyptranthes	sintenisii
			C		6358	CATH3	Thomas' lidflower						Calyptranthes	thomasiana
			C		6359	CAZU	myrtle of the river						Calyptranthes	zuzygium
			C		6360	CARI3	Puerto Rico manac						Calyptronoma	rivalis
			C		6370	CAOD	ilang-ilang						Cananga	odorata
			C		6380	CAWI	wild cinnamon						Canella	winteriana
			C		6383	CAAM13	burro blanco						Capparis	amplissima
			C		6384	CABA2	caper						Capparis	baducca
			C		6386	CACY	Jamaican caper						Capparis	cynophallophora
			C		6387	CAFL2	falseteeth						Capparis	flexuosa
			C		6389	CAHA9	broadleaf caper						Capparis	hastata
			C		6390	CAIN5	linguam						Capparis	indica
			C		6393	CAGU6	crabwood						Carapa	guianensis
			C		6395	CAPA23	papaya						Carica	papaya
			C		6402	CAAC3	rabo de ranton						Casearia	aculeata
			C		6403	CAAR8	gia verde						Casearia	arborea
			C		6406	CADE11	wild honeytree						Casearia	decandra
			C		6407	CAGU2	Guyanese wild coffee						Casearia	guianensis
			C		6410	CASY2	crackopen						Casearia	sylvestris
			C		6415	CAFI3	golden shower						Cassia	fistula

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			C		6417	CAGR11	pink shower						Cassia	grandis
			C		6418	CAJA3	apple blossom						Cassia	javanica
			C		6425	CAXY	marbletree						Cassine	xylocarpa
			C		6427	CAGU3	goatwood						Cassipourea	guianensis
			C		6429	CAER3	goatbush						Castela	erecta
			C		6430	CAEL5	Panama rubbertree						Castilla	elastica
			C		6433	CACU8	river sheoak						Casuarina	cunninghamiana
			C		6434	CAEQ	beach sheoak						Casuarina	equisetifolia
			C		6439	CALO8	Haitian catalpa						Catalpa	longissima
			C		6443	CESC9	pumpwood						Cecropia	schreberiana
			C		6445	CEOD	Spanish cedar						Cedrela	odorata
			C		6447	CEAC4	pochote						Ceiba	acuminata
			C		6448	CEAE2	pochote						Ceiba	aesculifolia
			C		6449	CEPE2	kapoktree						Ceiba	pentandra
			C		6454	CETR3	almex						Celtis	trinervia
			C		6457	CESI3	St. John's bread						Ceratonia	siliqua
			C		6468	CEHE3	lady of the night cactus						Cereus	hexagonus
			C		6469	CEHI3	Cereus hildmannianus						Cereus	hildmannianus
			C		6474	CEDI6	day jessamine						Cestrum	diurnum
			C		6475	CELA2	galen del monte						Cestrum	laurifolium
			C		6477	CENO	night jessamine						Cestrum	nocturnum
			C		6481	CHAR8	jointed sandmat						Chamaesyce	articulata
			C		6519	CHAX2	hueso						Chionanthus	axilliflorus
			C		6520	CHCO12	bridgotree						Chionanthus	compactus
			C		6521	CHDO4	white rosewood						Chionanthus	domingensis

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			C		6522	CHHO4	hueso prieto						Chionanthus	holdridgei
			C		6523	CHLI6	cabra blanca						Chionanthus	ligustrinus
			C		6526	CHSE5	puntaj jayuya						Chione	seminervis
			C		6528	CHVE4	fatpork						Chione	venosa
			C		6529	CHEX5	african teak						Chlorophora	excelsa
			C		6532	CHSP13	silk-floss tree						Chorisia	speciosa
			C		6535	CHIC	icaco coco plum						Chrysobalanus	icaco
			C		6539	CHAR6	bastard redwood						Chrysophyllum	argenteum
			C		6541	CHCA10	star apple						Chrysophyllum	cainito
			C		6542	CHOL	satinleaf						Chrysophyllum	oliviforme
			C		6543	CHPA31	camito de perro						Chrysophyllum	pauciflorum
			C		6554	CIAR8	cassia						Cinnamomum	aromaticum
			C		6559	CIEL2	laurel avispillo						Cinnamomum	elongatum
			C		6560	CIMO3	avispillo						Cinnamomum	montanum
			C		6564	CIVE2	cinnamon						Cinnamomum	verum
			C		6565	CICA8	juniper berry						Citharexylum	caudatum
			C		6567	CISP3	spiny fiddlewood						Citharexylum	spinosum
			C		6569	CITR7	threespike fiddlewood						Citharexylum	tristachyum
			C		6573	CIAU7	grapefruit						Citrus	×aurantiifolia
			C		6574	CIAU8	Citrus ×aurantium						Citrus	×aurantium
			C		6575	CILI5	shaddock						Citrus	×limon
			C		6576	CIPA3	citron						Citrus	×paradisi
			C		6577	CISI3	tangerine						Citrus	×sinensis
			C		6581	CIMA5	Citrus maxima						Citrus	maxima
			C		6582	CIME3	Citrus medica						Citrus	medica
			C		6584	CIRE3	Citrus reticulata						Citrus	reticulata

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			C		6631	CLAC2	haggarbush						Clerodendrum	aculeatum
			C		6637	CLAL4	teta prieta						Cleyera	albopunctata
			C		6639	CLER	jackass breadnut						Clibadium	erosum
			C		6641	CLCY5	Clidemia cymosa						Clidemia	cymosa
			C		6642	CLHI3	soapbush						Clidemia	hirta
			C		6644	CLFA5	Philippine pigeonwings						Clitoria	fairchildiana
			C		6646	CLCL2	cupeillo						Clusia	clusioides
			C		6648	CLGU	Grundlach's attorney						Clusia	gundlachii
			C		6650	CLMI2	cupey de monte						Clusia	minor
			C		6651	CLRO	Scotch attorney						Clusia	rosea
			C		6653	CNHO	deepwoods fern						Cnemidaria	horrida
			C		6655	CNAC	treadsoftly						Cnidoscolus	aconitifolius
			C		6658	COCO8	uvilla						Coccoloba	costata
			C		6660	COKR	whitewood						Coccoloba	krugii
			C		6661	COMI	puckhout						Coccoloba	microstachya
			C		6662	COPA24	pale seagrape						Coccoloba	pallida
			C		6663	COPU	grandleaf seagrape						Coccoloba	pubescens
			C		6664	COPY	uvera						Coccoloba	pyrifolia
			C		6665	CORU4	ortegon						Coccoloba	rugosa
			C		6666	COSI2	uvero de monte						Coccoloba	sintenisii
			C		6668	COSW	Swartz's pigeonplum						Coccoloba	swartzii
			C		6669	COTE9	Bahama pigeonplum						Coccoloba	tenuifolia
			C		6670	COUV	seagrape						Coccoloba	uvifera
			C		6671	COVE	false chiggergrape						Coccoloba	venosa
			C		6673	COBA3	Coccothrinax barbadensis						Coccothrinax	barbadensis

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			C		6679	COVI	silk cottontree						Cochlospermum	vitifolium
			C		6683	COVA3	garden croton						Codiaeum	variegatum
			C		6684	COAR2	Arabian coffee						Coffea	arabica
			C		6686	COLI8	Coffea liberica						Coffea	liberica
			C		6688	COAR9	Cojoba arborea						Cojoba	arborea
			C		6689	COAC4	abata cola						Cola	acuminata
			C		6693	COAR3	greenheart						Colubrina	arborescens
			C		6700	COVE6	Urban's nakedwood						Colubrina	verrucosa
			C		6705	CODO	poison ash						Comocladia	dodonaea
			C		6706	COGL4	carrasco						Comocladia	glabra
			C		6710	CORU17	Luquillo Mountain snailwood						Conostegia	rufescens
			C		6711	COMO8	Consolea moniliformis						Consolea	moniliformis
			C		6712	CORU8	Consolea rubescens						Consolea	rubescens
			C		6714	COOF2	copaiba						Copaifera	officinalis
			C		6728	COAL	Spanish elm						Cordia	alliodora
			C		6730	COBO3	muneco						Cordia	borinquensis
			C		6731	COCO5	red manjack						Cordia	collococca
			C		6735	COLA12	smooth manjack						Cordia	laevigata
			C		6737	COOB3	clammy cherry						Cordia	obliqua
			C		6738	CORI	San Bartolome						Cordia	rickseckeri
			C		6739	CORU5	Puerto Rico manjack						Cordia	rupicola
			C		6743	COSU3	mucilage manjack						Cordia	sulcata
			C		6746	COOB4	nigua						Cornutia	obovata
			C		6747	COPY2	azulejo						Cornutia	pyramidata
			C		6750	COCI4	Corymbia citriodora						Corymbia	citriodora

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			C		6756	COGU3	cannonball tree						Couroupita	guianensis
			C		6761	CRCU	common calabash tree						Crescentia	cujete
			C		6762	CRLI5	higuerito						Crescentia	linearifolia
			C		6763	CRPO6	higuero de sierra						Crescentia	portoricensis
			C		6765	CRPO7	Critonia portoricensis						Critonia	portoricensis
			C		6767	CRRH	maidenberry						Crossopetalum	rhacoma
			C		6773	CRAS3	wild marrow						Croton	astroites
			C		6774	CRFL23	Croton flavens						Croton	flavens
			C		6775	CRPO4	sabinon						Croton	poecilanthus
			C		6786	CRJA3	Japanese cedar						Cryptomeria	japonica
			C		6788	CULA	Chinese fir						Cunninghamia	lanceolata
			C		6790	CUAM	wild ackee						Cupania	americana
			C		6792	CUTR	guara blanca						Cupania	triquetra
			C		6795	CULU2	cedar-of-Goa						Cupressus	lusitanica
			C		6796	CUSE2	Italian cypress						Cupressus	sempervirens
			C		6834	CYAN	parrotfeather treefern						Cyathea	andina
			C		6835	CYAR	West Indian treefern						Cyathea	arborea
			C		6839	CYFU	Jamaican treefern						Cyathea	furfuracea
			C		6843	CYPA7	small treefern						Cyathea	parvula
			C		6848	CYTE10	helecho gigante						Cyathea	tenera
			C		6850	CYSI	Cybianthus sintenisii						Cybianthus	sintenisii
			C		6852	CYCI3	queen sago						Cycas	circinalis
			C		6857	CYPO2	oreganillo falso						Cynometra	portoricensis
			C		6862	CYRA	swamp titi						Cyrilla	racemiflora
			C		6867	DAEX	candletree						Dacryodes	excelsa

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			C		6869	DASI	Indian rosewood						Dalbergia	sissoo
			C		6871	DAAM2	burn nose						Daphnopsis	americana
			C		6872	DAHE2	Heller's cieneguillo						Daphnopsis	helleriana
			C		6873	DAPH	emajagua de sierra						Daphnopsis	philippiana
			C		6883	DERE	royal poinciana						Delonix	regia
			C		6888	DEAR	angelica tree						Dendropanax	arboreus
			C		6889	DELA3	palo de vaca						Dendropanax	laurifolius
			C		6896	DIIN6	chulta						Dillenia	indica
			C		6899	DILO7	Dimocarpus longan						Dimocarpus	longan
			C		6909	DIRE6	black apple						Diospyros	revoluta
			C		6912	DISI3	Chinese persimmon						Diospyros	sintenisii
			C		6923	DIMY	jaboncillo						Ditta	myricoides
			C		6927	DOVI	Florida hopbush						Dodonaea	viscosa
			C		6930	DOHE2	Ceylon gooseberry						Dovyalis	hebecarpa
			C		6932	DRFR2	fragrant dracaena						Dracaena	fragrans
			C		6937	DRAL5	cafeillo						Drypetes	alba
			C		6938	DRGL2	varital						Drypetes	glauca
			C		6939	DRIL	rosewood						Drypetes	ilicifolia
			C		6940	DRLA3	guiana plum						Drypetes	lateriflora
			C		6961	DUER	golden dewdrops						Duranta	erecta
			C		6966	DYLU	Dypsis lutescens						Dypsis	lutescens
			C		6996	ENCY	monkeysoap						Enterolobium	cyclocarpum
			C		6998	ERJA3	loquat						Eriobotrya	japonica
			C		7000	ERFR4	blacktorch						Erithalis	fruticosa
			C		7004	ERBE3	machete						Erythrina	berteriana
			C		7005	ERCO22	coral erythrina						Erythrina	corallodendron

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			C		7006	ERCR6	crybabytree						Erythrina	crista-galli
			C		7007	EREG	cock's spur						Erythrina	eggersii
			C		7008	ERFU2	bucayo						Erythrina	fusca
			C		7011	ERPO5	mountain immortelle						Erythrina	poeppigiana
			C		7015	ERVA7	tiger's claw						Erythrina	variegata
			C		7016	ERVAO	tiger's claw						Erythrina	variegate var. orientalis
			C		7019	ERAR17	swamp-redwood						Erythroxylum	areolatum
			C		7021	ERRO3	ratwood						Erythroxylum	rotundifolium
			C		7022	ERRU4	rufous false cocaine						Erythroxylum	rufum
			C		7024	ERUR4	Urban's false cocaine						Erythroxylum	urbanii
			C		7034	EUDE2	Indonesian gum						Eucalyptus	deglupta
			C		7043	EUMA23	spotted gum						Eucalyptus	maculata
			C		7046	EUPA	gray ironbark						Eucalyptus	paniculata
			C		7049	EURE2	redmahogany						Eucalyptus	resinifera
			C		7053	EUSA	Sydney bluegum						Eucalyptus	saligna
			C		7060	EUAX	white stopper						Eugenia	axillaris
			C		7061	EUBI	blackrodwood						Eugenia	biflora
			C		7062	EUBO3	Sierra de Cayey stopper						Eugenia	boqueronensis
			C		7063	EUBO4	guayabota de sierra						Eugenia	borinquensis
			C		7066	EUCO4	redberry stopper						Eugenia	confusa
			C		7067	EUCO5	lathberry						Eugenia	cordata
			C		7068	EUCOS	Eugenia cordata						Eugenia	cordata var. sintenisii
			C		7069	EUCO13	sperry guava						Eugenia	corozalensis
			C		7071	EUDO	serrette guave						Eugenia	domingensis
			C		7072	EUEG	guasabara						Eugenia	eggersii

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			C		7075	EUGL6	smooth rodwood						Eugenia	glabrata
			C		7076	EUHA4	Luquillo Mountain stopper						Eugenia	haematocarpa
			C		7081	EULI	privet stopper						Eugenia	ligustrina
			C		7084	EUMO	birdcherry						Eugenia	monticola
			C		7089	EUPR4	rockmyrtle						Eugenia	procera
			C		7090	EUPS	Christmas cherry						Eugenia	pseudopsidium
			C		7093	EUSE9	serrasuela						Eugenia	serrasuela
			C		7094	EUSE10	sessileleaf stopper						Eugenia	sessiliflora
			C		7098	EUST3	Stahl's stopper						Eugenia	stahlii
			C		7100	EUST6	Stewardson's stopper						Eugenia	stewardsonii
			C		7103	EUUN	Underwood's stopper						Eugenia	underwoodii
			C		7104	EUUN2	Surinam cherry						Eugenia	uniflora
			C		7105	EUXE	aridland stopper						Eugenia	xerophytica
			C		7109	EUCO24	Mexican shrubby spurge						Euphorbia	cotinifolia
			C		7111	EULA8	mottled spurge						Euphorbia	lactea
			C		7112	EUNE4	Indian spurgetree						Euphorbia	neriifolia
			C		7113	EUPE8	manchineel berry						Euphorbia	petiolaris
			C		7116	EUTI	Indiantree spurge						Euphorbia	tirucalli
			C		7135	EXCA	Caribbean princewood						Exostema	caribaeum
			C		7136	EXEL	plateado						Exostema	ellipticum
			C		7137	EXSA2	Exostema sanctae-luciae						Exostema	sanctae-luciae
			C		7146	FAOC	false coffee						Faramea	occidentalis
			C		7148	FIAM	Jamaican cherry fig						Ficus	americana
			C		7149	FIBE2	Indian banyan						Ficus	benghalensis
			C		7150	FIBE	weeping fig						Ficus	benjamina

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			C		7151	FICA	edible fig						Ficus	carica
			C		7154	FIDR3	brown-woolly fig						Ficus	drupacea
			C		7155	FIEL	Indian rubberplant						Ficus	elastica
			C		7158	FILU	Ficus lutea						Ficus	lutea
			C		7159	FILY	fiddleleaf fig						Ficus	lyrata
			C		7160	FIMI2	Chinese banyan						Ficus	microcarpa
			C		7162	FINO3	tibig						Ficus	nota
			C		7164	FIOB	amate						Ficus	obtusifolia
			C		7166	FIRE3	peepul tree						Ficus	religiosa
			C		7173	FIST	jaguey						Ficus	stahlii
			C		7174	FISY2	sycamore fig						Ficus	sycomorus
			C		7177	FITR	jaguey blanco						Ficus	trigonata
			C		7184	FLIN	governor's plum						Flacourtia	indica
			C		7185	FLIN3	batoko plum						Flacourtia	inermis
			C		7190	FLAC	Flueggea acidoton						Flueggea	acidoton
			C		7194	FOEG	inkbush						Forestiera	eggersiana
			C		7195	FORH	caca ravet						Forestiera	rhamnifolia
			C		7196	FOSE	Florida swampprivet						Forestiera	segregata
			C		7198	FOMA2	oval kumquat						Fortunella	margarita
			C		7202	FRSPL	West Indian buckthorn						Frangula	sphaerosperma
			C		7206	FRUH	shamel ash						Fraxinus	uhdei
			C		7210	FUEL	silkrubber						Funtumia	elastica
			C		7212	GADU3	Gourka						Garcinia	dulcis
			C		7213	GAHE5	lemon saptree						Garcinia	hessii
			C		7214	GAMA10	mangosteen						Garcinia	mangostana

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			C		7218	GAPO2	palo de cruz						Garcinia	portoricensis
			C		7223	GAXA	Garcinia xanthochymus						Garcinia	xanthochymus
			C		7231	GAAT	llume						Gaussia	attenuata
			C		7235	GEAM	jagua						Genipa	americana
			C		7237	GEPE4	arbol de Navidad						Gesneria	pedunculosa
			C		7239	GIRO	bastard gregre						Ginoria	rohrii
			C		7245	GLSE2	quickstick						Gliricidia	sepium
			C		7256	GOEL	mata buey						Goetzea	elegans
			C		7258	GOLI	grand merisier						Gomidesia	lindeniana
			C		7262	GOBA	Creole cotton						Gossypium	barbadense
			C		7264	GOHIH2	Gossypium hirsutum						Gossypium	hirsutum
			C		7268	GROT	Graffenrieda ottoschulzii						Graffenrieda	ottoschulzii
			C		7273	GRRO	silkoak						Grevillea	robusta
			C		7279	GUOF	lignum-vitae						Guajacum	officinale
			C		7280	GUSA	holywood						Guajacum	sanctum
			C		7285	GUFR	black mampoo						Guapira	fragrans
			C		7286	GUOB	corcho prieto						Guapira	obtusata
			C		7288	GUGL3	alligatorwood						Guarea	glabra
			C		7290	GUGU	American muskwood						Guarea	guidonia
			C		7294	GUBL	haya minga						Guatteria	blainii
			C		7295	GUCA2	haya blanca						Guatteria	caribaea
			C		7298	GUUL	bastardcedar						Guazuma	ulmifolia
			C		7299	GUEL	hammock velvetseed						Guettarda	elliptica
			C		7300	GUKR	frogwood						Guettarda	krugii
			C		7302	GUOD	cucubano de vieques						Guettarda	odorata

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			C		7303	GUOV	cucubano						Guettarda	ovalifolia
			C		7305	GUPU	roseta						Guettarda	pungens
			C		7306	GUSC	wild guave						Guettarda	scabra
			C		7309	GUVA	cucubano de monte						Guettarda	valenzuelana
			C		7315	GYLA	West Indian false box						Gyminda	latifolia
			C		7317	GYLU	oysterwood						Gymnanthes	lucida
			C		7321	HACA2	bloodwoodtree						Haematoxylum	campechianum
			C		7327	HASAO	palo de hueso						Haenianthus	salicifolius
			C		7330	HAPA3	scarletbush						Hamelia	patens
			C		7336	HECU10	false locust						Hebestigma	cubense
			C		7341	HEAR	cigarbush						Hedyosmum	arborescens
			C		7347	HEJA	screwtree						Helicteres	jamaicensis
			C		7353	HEFA5	camasey peludo						Henriettea	fascicularis
			C		7354	HEMA11	MacFadyen's camasey						Henriettea	macfadyenii
			C		7355	HEME5	thinleaf camasey						Henriettea	membranifolia
			C		7357	HESQ	jusillo						Henriettea	squamulosum
			C		7366	HESO	mago						Hernandia	sonora
			C		7403	HIEL	mahoe						Hibiscus	elatus
			C		7409	HIPE3	seaside mahoe						Hibiscus	pernambucensis
			C		7410	HIRO3	shoeblackplant						Hibiscus	rosa-sinensis
			C		7412	HITI	sea hibiscus						Hibiscus	tiliaceus
			C		7418	HIRU2	teta de burra cinarron						Hirtella	rugosa
			C		7420	HITR3	pigeonberry						Hirtella	triandra
			C		7422	HORA	white cogwood						Homalium	racemosum
			C		7434	HUCR	sandbox tree						Hura	crepitans

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			C		7438	HYCL	cedro macho						Hyeronima	clusioides
			C		7442	HYCO	stinkingtoe						Hymenaea	courbaril
			C		7445	HYTR	inkwood						Hypelate	trifoliata
			C		7446	HYLA8	limestone snakevine						Hyperbaena	laurifolia
			C		7455	ILCA	dahoon						Ilex	cassine
			C		7456	ILCO3	te						Ilex	cookii
			C		7457	ILGU	maconcona						Ilex	guianensis
			C		7458	ILMA	Caribbean holly						Ilex	macfadyenii
			C		7459	ILNI	Puerto Rico holly						Ilex	nitida
			C		7462	ILSI	gongolin						Ilex	sideroxyloides
			C		7463	ILSI2	Sintenis' holly						Ilex	sintenisii
			C		7465	ILUR	Urban's holly						Ilex	urbaniana
			C		7466	ILURR	Ilex urbaniana						Ilex	urbaniana var riedlaei
			C		7467	INGA	inga						Inga	spp.
			C		7470	INLA	sacky sac bean						Inga	laurina
			C		7471	INNOQ	Inga nobilis						Inga	nobilis
			C		7474	INVE	river koko						Inga	vera
			C		7479	IXFE	palo de hierro						Ixora	ferrea
			C		7481	IXTH	white jungleflame						Ixora	thwaitesii
			C		7482	JAMI	black poui						Jacaranda	mimosifolia
			C		7485	JAAR2	braceletwood						Jacquinia	armillaris
			C		7487	JABE	bois bande						Jacquinia	berteroi
			C		7490	JAUM	chirriador						Jacquinia	umbellata
			C		7491	JACU2	Barbados nut						Jatropha	curcas
			C		7492	JAHE	wild oilnut						Jatropha	hernandiifolia

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			C		7493	JAMU	coralbush						Jatropha	multifida
			C		7495	JUJA	West Indian walnut						Juglans	jamaicensis
			C		7499	KHAN	Khaya anthotheca						Khaya	anthotheca
			C		7501	KHSE2	Senegal mahogany						Khaya	senegalensis
			C		7503	KIAF	Kigelia africana						Kigelia	africana
			C		7506	KLHO	guest tree						Kleinhovia	hospita
			C		7508	KOPO	Koanophyllon polyodon						Koanophyllon	polyodon
			C		7514	KRFE	leadwood						Krugiodendron	ferreum
			C		7530	LAPR2	cuero de rana						Laetia	procera
			C		7532	LAIN	crapemyrtle						Lagerstroemia	indica
			C		7533	LASP	pride of India						Lagerstroemia	speciosa
			C		7541	LAPO	nino de cota						Laplacea	portoricensis
			C		7550	LAIN5	henna						Lawsonia	inermis
			C		7552	LEKR	Krug's roughleaf						Leandra	krugiana
			C		7556	LEQU	pitahaya						Leptocereus	quadricostatus
			C		7565	LELE10	white leadtree						Leucaena	leucocephala
			C		7569	LIBR5	Maria laurel						Licaria	brittoniana
			C		7570	LIPA9	Puerto Rico cinnamon						Licaria	parvifolia
			C		7573	LITR	pepperleaf sweetwood						Licaria	triandra
			C		7574	LIAM	Amur privet						Ligustrum	amurense
			C		7590	LODO5	geno geno						Lonchocarpus	domingensis
			C		7591	LOGL2	geno						Lonchocarpus	glaucifolius
			C		7592	LOHE7	broadleaf lancepod						Lonchocarpus	heptaphyllus
			C		7600	LUSP11	luehea						Luehea	speciosa
			C		7604	LUNAN	lunania						Lunania	spp.

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			C		7606	LUEK	Lunania ekmanii						Lunania	ekmanii
			C		7608	LYRU2	St. Thomas staggerbush						Lyonia	rubiginosa
			C		7628	MALU2	palo de hoz						Machaerium	lunatum
			C		7630	MAPO6	Puerto Rico alfilerillo						Machaonia	portoricensis
			C		7632	MATI3	Maclura tinctoria						Maclura	tinctoria
			C		7633	MAEM2	umbrella-tree						Maesopsis	eminii
			C		7635	MAPO2	Puerto Rico magnolia						Magnolia	portoricensis
			C		7636	MASP	laurel magnolia						Magnolia	splendens
			C		7643	MACO11	Singapore holly						Malpighia	coccigera
			C		7644	MAEM	Barbados cherry						Malpighia	emarginata
			C		7645	MAFU2	palo bronco						Malpighia	fucata
			C		7646	MAGL6	wild crapemyrtle						Malpighia	glabra
			C		7647	MAIN5	cowhage cherry						Malpighia	infestissima
			C		7648	MALI2	bastard cherry						Malpighia	linearis
			C		7652	MAAM2	mammee apple						Mammea	americana
			C		7662	MABI5	bulletwood						Manilkara	bidentata
			C		7663	MABIS	Manilkara bidentata						Manilkara	bidentata ssp. surinamensis
			C		7667	MAJA2	wild dilly						Manilkara	jaimiqui
			C		7669	MAPL2	zapote de costa						Manilkara	pleeana
			C		7673	MAVA3	nisperillo						Manilkara	valenzuela
			C		7674	MAZA	sapodilla						Manilkara	zapota
			C		7677	MARA3	palo de cana						Mappia	racemosa
			C		7682	MANO	bastard hogberry						Margaritaria	nobilis
			C		7684	MASI3	beruquillo						Marlierea	sintenisii
			C		7688	MAAP5	Matayba apetala						Matayba	apetala

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			C		7689	MADO2	negra lora						Matayba	domingensis
			C		7695	MACY2	Caribbean mayten						Maytenus	cymosa
			C		7697	MAEL3	Puerto Rico mayten						Maytenus	elongata
			C		7698	MALA8	white cinnamon						Maytenus	laevigata
			C		7699	MAPO5	ponce mayten						Maytenus	ponceana
			C		7702	MELA7	Mecranium latifolium						Mecranium	latifolium
			C		7717	MEBI	Spanish lime						Melicoccus	bijugatus
			C		7763	MEHE	aguacatillo						Meliosma	herbertii
			C		7764	MEOB2	cacaillo						Meliosma	obtusifolia
			C		7768	METO4	teabush						Melochia	tomentosa
			C		7803	MILA10	hairy johnnyberry						Miconia	lanata
			C		7804	MIAF	saquiyac						Miconia	affinis
			C		7806	MIFO	Puerto Rico johnnyberry						Miconia	foveolata
			C		7807	MIIM	camasey de costilla						Miconia	impetiolaris
			C		7808	MILA8	smooth johnnyberry						Miconia	laevigata
			C		7810	MIMI3	camasey cuatrocanales						Miconia	mirabilis
			C		7812	MIPA7	camasey racimoso						Miconia	pachyphylla
			C		7813	MIPR3	granadillo bobo						Miconia	prasina
			C		7814	MIPU9	auquey						Miconia	punctata
			C		7815	MIPY2	ridge johnnyberry						Miconia	pycnoneura
			C		7816	MIRA2	camasey felpa						Miconia	racemosa
			C		7817	MIRU4	peralejo						Miconia	rubiginosa
			C		7818	MISE2	jau jau						Miconia	serrulata
			C		7819	MISI2	mountain johnnyberry						Miconia	sintenisii
			C		7821	MISU3	forest johnnyberry						Miconia	subcorymbosa

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			C		7822	MITE4	rajador						Miconia	tetrandra
			C		7823	MITH	camasey tomaso						Miconia	thomasiana
			C		7828	MIGA	caimitillo verde						Micropholis	garciniifolia
			C		7829	MIGU2	Micropholis guyanensis						Micropholis	guyanensis
			C		7833	MIAR4	elegant mimosa						Mimosa	arenosa
			C		7839	MONOD	monodora						Monodora	spp.
			C		7845	MOCE2	Morella cerifera						Morella	cerifera
			C		7847	MOHO3	Morella holdridgeana						Morella	holdridgeana
			C		7849	MOCI3	Indian mulberry						Morinda	citrifolia
			C		7855	MOOL	horseradishtree						Moringa	oleifera
			C		7857	MOAM	ratapple						Morisonia	americana
			C		7862	MODO2	murta						Mouriri	domingensis
			C		7863	MOHE	mameyuelo						Mouriri	helleri
			C		7867	MUCA4	strawberrytree						Muntingia	calabura
			C		7869	MUEX2	Murraya exotica						Murraya	exotica
			C		7886	MYCI	red rodwood						Myrcia	citrifolia
			C		7887	MYDE	cieneguillo						Myrcia	deflexa
			C		7888	MYFA3	curame						Myrcia	fallax
			C		7889	MYLE	guayabacon						Myrcia	leptoclada
			C		7890	MYPA	ausu						Myrcia	paganii
			C		7891	MYSP	punchberry						Myrcia	splendens
			C		7893	MYFR	twinberry						Myrcianthes	fragrans
			C		7895	MYFL	guavaberry						Myrciaria	floribunda
			C		7905	MYFR2	cercipo						Myrospermum	frutescens
			C		7907	MYBA3	balsam of Tolu						Myroxylon	balsamum

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			C		7911	MYCO2	leathery colicwood						Myrsine	coriacea
			C		7912	MYCU2	Myrsine cubana						Myrsine	cubana
			C		7932	NECO	Nectandra coriacea						Nectandra	coriacea
			C		7933	NEHI2	shinglewood						Nectandra	hihua
			C		7934	NEKR	Nectandra krugii						Nectandra	krugii
			C		7935	NEME3	Nectandra membranacea						Nectandra	membranacea
			C		7936	NEPA4	Nectandra patens						Nectandra	patens
			C		7939	NETU	Nectandra turbacensis						Nectandra	turbacensis
			C		7940	NEBU	saltwood						Neea	buxifolia
			C		7944	NECA7	kadam						Neolamarckia	cadamba
			C		7946	NERE2	aquilon						Neolaugeria	resinosa
			C		7956	NEOL	oleander						Nerium	oleander
			C		7976	OCMO4	African bird's-eye bush						Ochna	mossambicensis
			C		7980	OCPY	Ochroma pyramidale						Ochroma	pyramidale
			C		7990	OCFL	laurel espada						Ocotea	floribunda
			C		7991	OCFO	black sweetwood						Ocotea	foeniculacea
			C		7994	OCLE	loblolly sweetwood						Ocotea	leucoxylon
			C		7996	OCMO	nemoca						Ocotea	moschata
			C		7997	OCNE	laurel sassafras						Ocotea	nemodaphne
			C		7999	OCPO	laurel de paloma						Ocotea	portoricensis
			C		8001	OCSP	nemoca cimarrona						Ocotea	spathulata
			C		8003	OCWR	Wright's laurel canelon						Ocotea	wrightii
			C		8020	ORKR	peronia						Ormosia	krugii
			C		8027	OTRH	pincho palo de rosa						Ottoschulzia	rhodoxylon
			C		8029	OUIL	chicharron amarillo						Ouratea	ilicifolia

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			C		8030	OULI	abey amarillo						Ouratea	littoralis
			C		8032	OUST	guanabanilla						Ouratea	striata
			C		8033	OXLA4	blacklancewood						Oxandra	lanceolata
			C		8034	OXLA5	haya						Oxandra	laurifolia
			C		8037	PAIN7	wild chestnut						Pachira	insignis
			C		8045	PAAL9	tafetan						Palicourea	alpina
			C		8047	PACR3	red cappel						Palicourea	crocea
			C		8049	PACR18	Palicourea croceoides						Palicourea	croceoides
			C		8051	PAGU	showy cappel						Palicourea	guianensis
			C		8088	PAUT	common screwpine						Pandanus	utilis
			C		8099	PACR2	scratchthroat						Parathesis	crenulata
			C		8106	PARKI3	parkia						Parkia	spp.
			C		8110	PATI5	Parkia timoriana						Parkia	timoriana
			C		8111	PAAC3	Jerusalem thorn						Parkinsonia	aculeata
			C		8113	PAAC13	cuachilote						Parmentiera	aculeata
			C		8114	PACE8	candle tree						Parmentiera	cereifera
			C		8121	PEPT3	Peltophorum pterocarpum						Peltophorum	pterocarpum
			C		8125	PEBU4	butter tree						Pentadesma	butyracea
			C		8127	PEBU2	jiqi						Pera	bumeliifolia
			C		8134	PEKR	canela						Persea	krugii
			C		8138	PEUR2	aquacatillo						Persea	urbaniana
			C		8141	PEDO	bastard stopper						Petitia	domingensis
			C		8143	PHGR11	aquilon prieto						Phialanthus	grandifolius
			C		8144	PHMY	candlewood						Phialanthus	myrtilloides
			C		8157	PHAC3	Tahitian gooseberry tree						Phyllanthus	acidus

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			C		8160	PHJU2	gamo de costa						Phyllanthus	juglandifolius
			C		8162	PHOR10	Phyllanthus orbicularis						Phyllanthus	orbicularis
			C		8164	PIPE	Florida bitterbush						Picramnia	pentandra
			C		8167	PIEX	bitterwood						Picrasma	excelsa
			C		8169	PIAC	fustic						Pictetia	aculeata
			C		8171	PIRA3	aceitillo						Pilocarpus	racemosus
			C		8173	PIRO6	Royen's tree cactus						Pilosocereus	royenii
			C		8175	PIDI2	allspice						Pimenta	dioica
			C		8177	PIRA	bayrumtree						Pimenta	racemosa
			C		8178	PIRAG	bayrumtree						Pimenta	racemosa var. grisea
			C		8183	PICA18	Caribbean pine						Pinus	caribaea
			C		8184	PIMA11	Chinese red pine						Pinus	massoniana
			C		8185	PIME2	Merkus pine						Pinus	merkusii
			C		8186	PIOO2	ocote chino						Pinus	oocarpa
			C		8187	PIPA13	Mexican weeping pine						Pinus	patula
			C		8190	PIAD	higuillo de hoja menuda						Piper	aduncum
			C		8191	PIAM2	higuillo de limon						Piper	amalago
			C		8192	PIBL	moth pepper						Piper	blattarum
			C		8193	PIGL3	Guyanese pepper						Piper	glabrescens
			C		8194	PIHI2	Jamaican pepper						Piper	hispidum
			C		8195	PIJA	Caracas pepper						Piper	jacquemontianum
			C		8196	PIMA4	marigold pepper						Piper	marginatum
			C		8199	PISW	spanish elder						Piper	swartzianum
			C		8208	PICA5	stinkwood						Piscidia	carthagenensis
			C		8211	PIAL3	corcho bobo						Pisonia	albida

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			C		8216	PISU	water mampoo						Pisonia	subcordata
			C		8220	PIDU	monkeypod						Pithecellobium	dulce
			C		8223	PIUN	catclaw blackbead						Pithecellobium	unguis-cati
			C		8249	PLOR80	Oriental arborvitae						Platycladus	orientalis
			C		8255	PLMA6	chupa gallo						Pleodendron	macranthum
			C		8266	PLAL	nosegaytree						Plumeria	alba
			C		8268	PLOB2	Singapore graveyard flower						Plumeria	obtusa
			C		8269	PLOBO	Plumeria obtusa						Plumeria	obtusa var. obtusa
			C		8271	PLRU2	templetree						Plumeria	rubra
			C		8273	POCO3	yucca plum pine						Podocarpus	coriaceus
			C		8275	POFL20	Poitea florida						Poitea	florida
			C		8276	POPU19	Poitea punicea						Poitea	punicea
			C		8279	POCO5	violet tree						Polygala	cowellii
			C		8280	POPE13	crevajosa						Polygala	penaea
			C		8284	POGU	geranium aralia						Polyscias	guilfoylei
			C		8300	PODI5	cocuyo						Pouteria	dictyoneura
			C		8301	POHO4	redmammee						Pouteria	hotteana
			C		8302	POMU6	bullytree						Pouteria	multiflora
			C		8305	POSA13	mammee sapote						Pouteria	sapota
			C		8311	PRACM	Prestoea acuminata						Prestoea	acuminata
			C		8340	PRCR2	guasimilla						Prockia	crucis
			C		8342	PRCI4	jand						Prosopis	cineraria
			C		8344	PRPA4	kiawe						Prosopis	pallida
			C		8346	PRMY	West Indian cherry						Prunus	myrtifolia
			C		8347	PROC	western cherry laurel						Prunus	occidentalis

Core	East	West	Carib bean	Wood land	FIA Code	PLANTS Code	Common Name	Common name NRS	Common name SRS	Common name RMRS	Common name PNWRS	Common name Caribbean	Genus	Species
			C		8349	PRSEC	Prunus serotina						Prunus	serotina ssp. capuli
			C		8352	PSSP2	false breadnut						Pseudolmedia	spuria
			C		8353	PSSA	Florida cherry palm						Pseudophoenix	sargentii
			C		8354	PSAM	mountain guava						Psidium	amplexicaule
			C		8356	PSGU	guava						Psidium	guajava
			C		8358	PSLOO	Psidium longipes						Psidium	longipes
			C		8359	PSSI2	Sintenis' guava						Psidium	sintenisii
			C		8361	PSBE	cachimbo-cumun						Psychotria	berteriana
			C		8362	PSBR2	palo de cachimbo						Psychotria	brachiata
			C		8363	PSBR3	Browne's wild coffee						Psychotria	brownei
			C		8364	PSDO2	Psychotria domingensis						Psychotria	domingensis
			C		8367	PSGR2	cachimbo grande						Psychotria	grandis
			C		8389	PSMA4	cachimbo de gato						Psychotria	maleolens
			C		8391	PSMA5	cachimbo de maricao						Psychotria	maricaensis
			C		8394	PSMI	thicket wild coffee						Psychotria	microdon
			C		8395	PSNU2	floating balsamo						Psychotria	nutans
			C		8397	PSPU	hairy wild coffee						Psychotria	pubescens
			C		8407	PTIN2	pterocarpus						Pterocarpus	indicus
			C		8408	PTMA7	Burma padauk						Pterocarpus	macrocarpus
			C		8409	PTMA3	Malabar kino						Pterocarpus	marsupium
			C		8410	PTOF	dragonsblood tree						Pterocarpus	officinalis
			C		8419	PUGR2	pomegranate						Punica	granatum
			C		8422	QUTU	swizzlestick tree						Quararibea	turbinata
			C		8425	RAAC	white indigoberry						Randia	aculeata
			C		8433	RANI2	palo amargo						Rauvolfia	nitida

Core	East	West	Carib bean	Wood land	FIA Code	PLANTS Code	Common Name	Common name NRS	Common name SRS	Common name RMRS	Common name PNWRS	Common name Caribbean	Genus	Species
			C		8436	RAMA7	traveler's tree						Ravenala	madagascariensis
			C		8439	RAUR	tortugo prieto						Ravenia	urbanii
			C		8444	REGU	guama						Reynosia	guama
			C		8445	REKR	Krug's darlingplum						Reynosia	krugii
			C		8447	REUN	sloe						Reynosia	uncinata
			C		8472	RICO3	castorbean						Ricinus	communis
			C		8476	ROAC2	greenheart ebony						Rochefortia	acanthophora
			C		8478	ROSP8	Rochefortia spinosa						Rochefortia	spinosa
			C		8481	ROMU3	wild sugar apple						Rollinia	mucosa
			C		8483	ROIN4	cordobancillo						Rondeletia	inermis
			C		8484	ROPI3	cordobancillo peludo						Rondeletia	pilosa
			C		8485	ROPO	Juan Tomas						Rondeletia	portoricensis
			C		8489	ROBO	Puerto Rico royal palm						Roystonea	borinquena
			C		8490	ROEL	Roystonea elata						Roystonea	elata
			C		8494	SACA	Puerto Rico palmetto						Sabal	causiarum
			C		8499	SAUM3	white hogwood						Sagraea	umbrosa
			C		8501	SAHU	Salix humboldtiana						Salix	humboldtiana
			C		8505	SASA10	raintree						Samanea	saman
			C		8509	SANIC4	common elderberry						Sambucus	nigra
			C		8529	SASA4	wingleaf soapberry						Sapindus	saponaria
			C		8533	SAGL5	gumtree						Sapium	glandulosum
			C		8535	SALA25	hinchahuevos						Sapium	laurifolium
			C		8536	SALA8	milktree						Sapium	laurocerasus
			C		8546	SASE6	amansa guapo						Savia	sessiliflora
			C		8554	SCFR	Florida boxwood						Schaefferia	frutescens

Core	East	West	Carib bean	Wood land	FIA Code	PLANTS Code	Common Name	Common name NRS	Common name SRS	Common name RMRS	Common name PNWRS	Common name Caribbean	Genus	Species
			C		8556	SADO7	guayabilla						Samyda	dodecandra
			C		8557	SCGL6	yuquilla						Schefflera	gleasonii
			C		8558	SCMO10	matchwood						Schefflera	morototonii
			C		8563	SCTE	Brazilian peppertree						Schinus	terebinthifolius
			C		8565	SCPA23	Brazilian firetree						Schizolobium	parahybum
			C		8567	SCOL3	lac tree						Schleichera	oleosa
			C		8571	SCAR2	arana						Schoepfia	arenaria
			C		8572	SCOB	white beefwood						Schoepfia	obovata
			C		8573	SCSC3	gulf graytwig						Schoepfia	schreberi
			C		8588	SEAL4	emperor's candlesticks						Senna	alata
			C		8589	SEAT3	flor de San Jose						Senna	atomaria
			C		8591	SEMU5	false sicklepod						Senna	multijuga
			C		8594	SEPO5	retama prieta						Senna	polyphylla
			C		8596	SESI3	Siamese cassia						Senna	siamea
			C		8597	SESP9	casia amarilla						Senna	spectabilis
			C		8599	SESU10	Senna sulfurea						Senna	sulfurea
			C		8600	SESU4	glossy shower						Senna	surattensis
			C		8605	SEGR5	vegetable hummingbird						Sesbania	grandiflora
			C		8611	SICU7	espejuelo						Sideroxylon	cubense
			C		8613	SIOB	breakbill						Sideroxylon	obovatum
			C		8614	SIPO3	Puerto Rico bully						Sideroxylon	portoricense
			C		8617	SIMAR	simarouba						Simarouba	spp.
			C		8619	SITU	aceitillo falso						Simarouba	tulae
			C		8620	SIDE6	hoja menuda						Siphoneugena	densiflora
			C		8622	SLOAN	bullwood						Sloanea	spp.

Core	East	West	Carib bean	Wood land	FIA Code	PLANTS Code	Common Name	Common name NRS	Common name SRS	Common name RMRS	Common name PNWRS	Common name Caribbean	Genus	Species
			C		8623	SLAM	motillo						Sloanea	amygdalina
			C		8624	SLBE	bullwood						Sloanea	berteriana
			C		8626	SOBAB	Solanum bahamense						Solanum	bahamense
			C		8627	SODO3	mullein nightshade						Solanum	donianum
			C		8629	SOER2	potatotree						Solanum	erianthum
			C		8632	SONU4	forest nightshade						Solanum	nudum
			C		8633	SOPO	cakalaka berry						Solanum	polygamum
			C		8634	SORU	tabacon aspero						Solanum	rugosum
			C		8636	SOTO4	turkey berry						Solanum	torvum
			C		8644	SPCA2	African tuliptree						Spathodea	campanulata
			C		8649	SPDU3	Spondias dulcis						Spondias	dulcis
			C		8650	SPMO	yellow mombin						Spondias	mombin
			C		8652	SPPU	purple mombin						Spondias	purpurea
			C		8654	STMO	cobana negra						Stahlia	monosperma
			C		8664	STAP	Panama tree						Sterculia	apetala
			C		8666	STFO2	hazel sterculia						Sterculia	foetida
			C		8674	STPO3	palo de jazmin						Styrax	portoricensis
			C		8676	SUMA2	bay cedar						Suriana	maritima
			C		8678	SWIET	mahogany						Swietenia	spp.
			C		8679	SWMA	Honduras mahogany						Swietenia	macrophylla
			C		8683	SYLA2	nispero cimarron						Symplocos	lanata
			C		8684	SYMA	Martinique sweetleaf						Symplocos	martinicensis
			C		8685	SYMI3	aceitunilla						Symplocos	micrantha
			C		8701	SYJA	Syzygium jambos						Syzygium	jambos
			C		8702	SYMA2	Malaysian apple						Syzygium	malaccense
			C		8709	TACH3	roble amarillo						Tabebuia	chrysantha

Core	East	West	Carib bean	Wood land	FIA Code	PLANTS Code	Common Name	Common name NRS	Common name SRS	Common name RMRS	Common name PNWRS	Common name Caribbean	Genus	Species
			C		8710	TADO2	primavera						Tabebuia	donnell-smithii
			C		8712	TAHA	roble cimarron						Tabebuia	haemantha
			C		8713	TAHE	white cedar						Tabebuia	heterophylla
			C		8715	TARI	roble de sierra						Tabebuia	rigida
			C		8716	TARO	pink trumpet-tree						Tabebuia	rosea
			C		8717	TASC2	roble colorado						Tabebuia	schumanniana
			C		8720	TACI	milkwood						Tabernaemontana	citrifolia
			C		8727	TAAP	Athel tamarisk						Tamarix	aphylla
			C		8743	TEST	yellow trumpetbush						Tecoma	stans
			C		8744	TEGR	teak						Tectona	grandis
			C		8748	TERMI	tropical almond						Terminalia	spp.
			C		8750	TECA	troipical almond						Terminalia	catappa
			C		8754	TEIV2	Ivory Coast almond						Terminalia	ivorensis
			C		8756	TEMY	East Indian almond						Terminalia	myriocarpa
			C		8757	TEOB	Peruvian almond						Terminalia	oblonga
			C		8761	TESU2	superb terminalia						Terminalia	superba
			C		8762	TEHE3	saintedwood						Ternstroemia	heptasepala
			C		8763	TELU2	palo colorado						Ternstroemia	luquillensis
			C		8764	TEPE	copey vera						Ternstroemia	peduncularis
			C		8766	TEST3	mamey de cura						Ternstroemia	stahlii
			C		8767	TESU	el yunque colorado						Ternstroemia	subsessilis
			C		8768	TEBA	masa						Tetragastris	balsamifera
			C		8778	TEAN2	stinkingfish						Tetrazygia	angustifolia
			C		8780	TEBI2	Puerto Rico clover ash						Tetrazygia	biflora
			C		8781	TEEL	krekre						Tetrazygia	elaeagnoides

Core	East	West	Carib bean	Wood land	FIA Code	PLANTS Code	Common Name	Common name NRS	Common name SRS	Common name RMRS	Common name PNWRS	Common name Caribbean	Genus	Species
			C		8783	TEUR	cenizo						Tetrazygia	urbanii
			C		8784	THCA	cacao						Theobroma	cacao
			C		8786	THGR2	maga						Thespesia	grandiflora
			C		8787	THPO3	Portia tree						Thespesia	populnea
			C		8789	THPE3	luckynut						Thevetia	peruviana
			C		8793	THST2	ceboruquillo						Thouinia	striata
			C		8794	THSTP	Puerto Rico ceboruquillo						Thouinia	striata var. portoricensis
			C		8803	TIGR3	Brazilian glorytree						Tibouchina	granulosa
			C		8811	TOONA	redcedar						Toona	spp.
			C		8812	TOCI	Australian redcedar						Toona	ciliata
			C		8816	TOCU	boje						Torralbasia	cuneifolia
			C		8825	TOFI	cold withe						Tournefortia	filiflora
			C		8828	TRLA2	Lamarck's trema						Trema	lamarckianum
			C		8829	TRMI2	Jamaican nettletree						Trema	micranthum
			C		8833	TRHI3	broomstick						Trichilia	hirta
			C		8834	TRPA2	gaita						Trichilia	pallida
			C		8836	TRTR8	bariaco						Trichilia	triacantha
			C		8842	TRTR7	limeberry						Triphasia	trifolia
			C		8843	TRIPL5	Triplaris spp.						Triplaris	spp.
			C		8844	TRCU6	ant tree						Triplaris	cumingiana
			C		8848	TRRA4	white ramoon						Trophis	racemosa
			C		8850	TUOC	muttonwood						Turpinia	occidentalis
			C		8853	URBA	scratchbush						Urera	baccifera
			C		8854	URCA2	flameberry						Urera	caracasana
			C		8855	URCH2	ortiga						Urera	chlorocarpa

Core	East	West	Carib bean	Wood land	FIA Code	PLANTS Code	Common Name	Common name NRS	Common name SRS	Common name RMRS	Common name PNWRS	Common name Caribbean	Genus	Species
			C		8861	VAMA5	voa vanga						Vangueria	madagascariensis
			C		8871	VIAG	lilac chastetree						Vitex	agnus-castus
			C		8873	VIDI2	higuerillo						Vitex	divaricata
			C		8881	WALA	Wallenia lamarckiana						Wallenia	lamarckiana
			C		8887	WEPI	bastard briziletto						Weinmannia	pinnata
			C		8901	XIAM	tallow wood						Ximenia	americana
			C		8906	XYBU	mucha-gente						Xylosma	buxifolia
			C		8910	XYPA2	spiny logwood						Xylosma	pachyphylla
			C		8912	XYSC2	white logwood						Xylosma	schaefferioides
			C		8913	XYSC3	Schwaneck's logwood						Xylosma	schwaneckeana
			C		8916	YUAL	aloe yucca						Yucca	aloifolia
			C		8918	YUGL2	moundlily yucca						Yucca	gloriosa
			C		8919	YUGU	bluestem yucca						Yucca	guatemalensis
			C		8923	ZABI	Maricao pricklyash						Zanthoxylum	bifoliolatum
			C		8924	ZACA3	prickly yellow						Zanthoxylum	caribaeum
			C		8928	ZAFL	West Indian satinwood						Zanthoxylum	flavum
			C		8931	ZAMA	white pricklyash						Zanthoxylum	martinicense
			C		8932	ZAMO	yellow prickle						Zanthoxylum	monophyllum
			C		8934	ZAPU2	dotted pricklyash						Zanthoxylum	punctatum
			C		8935	ZASP	niaragato						Zanthoxylum	spinifex
			C		8937	ZATH	St. Thomas pricklyash						Zanthoxylum	thomasianum
			C		8938	ZAPO2	Zapoteca portoricensis						Zapoteca	portoricensis
			C		8939	ZIMA	Indian jujube						Ziziphus	mauritiana
			C		8940	ZIRE	cacao rojo						Ziziphus	reticulata
			C		8941	ZIRI	soana						Ziziphus	rignonii

Core	East	West	Carib bean	Wood land	FIA Code	PLANTS Code	Common Name	Common name NRS	Common name SRS	Common name RMRS	Common name PNWRS	Common name Caribbean	Genus	Species
			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

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
	-------------------- **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

Code	Common Name	Region
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
0042	Alaska yellow-cedar	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

Code	Common Name	Region
	-------------------- 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

Appendix 5. Determination of Stocking Values for Land Use Classification

Stocking values are required to determine if a CONDITION CLASS STATUS = 1 (accessible forest land) exists on a plot. This will determine which data items must be recorded for the condition. When the CONDITION CLASS STATUS is in question (usually a nonforest area that is in the process of reverting to forest land or a marginal site that can only support a low number of trees), the crew must determine if there is sufficient stocking to classify the condition as forest. A minimum stocking value of 10 percent is required for accessible forest land (unless the condition was previously forested, such as a recent clear cut).

The following tables show the stocking values to assign to trees or the number of trees per acre to determine if a plot meets the minimum stocking to be considered forest land. In the determination of stocking for this purpose, the field crew should consider the condition over its entire area, not just the trees and seedlings that would be tallied on the subplots and microplots, especially when the plot straddles conditions. Also, for stocking purposes, consider a clump of trees (e.g., stump sprouts) less than 5 inches DBH to be a single tree.

The number of trees per acre needed to obtain minimum stocking depends on the DBH of the largest tree on the plot in the condition being evaluated, and the species and DBH of each of the tally trees. If the condition occurs on all four subplots and the trees are distributed fairly evenly over the entire condition area, the following steps can be used to determine if the condition has the minimum number of trees per acre for forest land.

Observe all of the trees on the plot and classify the condition, based on the tree with the largest DBH, into one of the following groups; the largest tree observed has a DBH of 5 inches or greater, 4.0-4.9 inches, 3.0-3.9 inches, 2.0-2.9 inches, 1.0-1.9 inches or less than 1.0 inch DBH. If you are using the *Stocking Values* table to determine if the condition meets minimum stocking, use table 5a, 5b, 5c, 5d, 5e, or 5f. If you are using the *Number of Trees* table to determine if the condition meets minimum stocking, use table 5g.

When using a *Stocking Values* table, begin a tally of each subplot and microplot and sum the stocking values for each tree tallied based upon its species and size class. When the stocking values for the tallied trees equals or exceeds 10, the condition meets the minimum stocking requirement for forest land.

For example, a condition that was formerly nonforest is no longer being maintained as nonforest and has begun to revert. A check of all four subplots and microplots confirms that the largest tree there is in the 3.0 – 3.9 inches DBH class. The tally of microplot 1 is one red maple (species code = 316) seedling. The sum of the stocking value (table 5a) to this point is 2.4 and the tally continues on microplot 2.

Subplot Number	Plot Type	Species	Size Class	Number Tallied	Stocking Value
1	2	316	< 1.0	1	2.4
Total					2.4

The tally at microplot 2 is two red maple seedlings. The stocking value for the two seedlings is 4.8. The cumulative stocking value to this point is 7.2. Since the minimum value of 10 percent stocking has not been reached, the tally continues to subplot 3.

Subplot Number	Plot Type	Species	Size Class	Number Tallied	Stocking Value
1	2	316	< 1.0	1	2.4
2	2	316	< 1.0	2	4.8
Total					7.2

At microplot 3 one sugar maple (species code = 318) sapling in the 1.0 – 1.9-inch DBH class is tallied. The cumulative stocking value is now 13.1 and the condition meets the minimum stocking to be considered forest land.

Subplot Number	Plot Type	Species	Size Class	Number Tallied	Stocking Value
1	2	316	< 1.0	1	2.4
2	2	316	< 1.0	2	4.8
3	2	318	1.0 – 1.9	1	5.9
Total					13.1

When trees of more than one diameter class are present, their contribution towards meeting the minimum must be combined. For example:

> In a lodgepole pine stand (species code = 108), the largest tree in the condition is 5.0+ inches DBH. If at least 20 trees that are 5.0-6.9 inches DBH are found on the four subplots, the minimum stocking of 10 percent (table 5b: 5th row, 1st column) is met. In the same condition only 5 tally trees in the 13.0-14.9-inch DBH class are needed to meet minimum stocking of 10 percent. If the tally were three 5.0-6.9-inch trees and two 13.0-14.9-inch DBH class trees (total stocking of 3 x 0.5 + 2 x 2.2 = 5.9), the combined stocking would not meet the minimum 10 percent (5.9 < 10) and the condition would be classified nonforest.

When using the *Number of Trees* table (table 5g), estimate the number of trees per acre by the diameter classes. When a condition exists on all 4 of the 24-ft radius subplots, each tally tree (DBH $\geq$ 5.0 inches) represents 6 trees per acre and each sapling (DBH $\geq$ 1.0 inch to < 5.0 inches) or seedling observed on the 4 microplots represents 75 trees per acre.

In sparse stands of smaller trees, a more accurate observation of trees per acre can be determined by observing trees < 5.0 inches DBH on the 24-ft radius subplot. In many forest types no more than 180 trees per acre of the largest diameter class are needed to meet the minimum stocking requirements, a total of 30 trees on all 4 subplots, 7 or 8 smaller trees on each subplot, will provide minimum stocking.

Other things observed on the plot will influence the determination of condition class status. In the last lodgepole pine example, evidence of a recent disturbance that reduced the stocking (cutting, fire, etc.) should be considered. Also, a very uneven distribution of the trees across the condition can greatly change the observed number of trees per acre on plots installed across the condition.

If the condition does not cover all four subplots entirely, trees per acre must be expanded using an expansion factor. The expansion factor is equal to 400/sum of the percent of subplot area (%ARE) for the condition. The trees per acre value of every diameter class is multiplied by this expansion factor.

If the trees are not uniformly distributed throughout the condition or the condition occurs on only a small portion of the plot (half the plot or less), use your best judgment in assigning status. You may place several additional temporary subplots in the condition in order to get a larger sample to base stocking on. When additional temporary subplots or judgment is used to assign land use, a note should be made on the plot sheet. Use the following procedure to establish these temporary subplots in a condition:

A. Consider locations 120.0 feet horizontal distance from the highest numbered subplot in the condition. First consider the location 0^o azimuth from the subplot center. If this location is unsuitable, consider in order locations at azimuth 120^o, and 240^o. When a suitable location has been found, establish the temporary subplot. Temporary subplots should be entirely within the condition (locations should not be within 24.0 feet of a mapped boundary).

B. If Step A fails to yield a suitable subplot location, repeat Step A at each of the next highest-numbered regular subplots in the condition.

C. If Steps A and B have been exhausted and a suitable temporary subplot still has not been found, repeat Step A at each temporary subplot in turn, beginning with the first temporary subplot that was established.

If more than one temporary subplot is to be established, repeat Steps A and B to establish the second lowest- numbered temporary subplot next, and continue in order until you have enough temporary subplots established in the condition to get a good, representative estimate of stocking. The general rule for establishing temporary subplots is:

- Install the lowest temporary subplot off the highest established subplot, until all the established subplots have been exhausted.
- Then establish the lowest temporary subplot yet to be established off the lowest one already established (lowest off highest, then lowest off lowest).

If there is a transition zone between two conditions use your best judgment to be sure that trees tallied in the transition zone do not have too much weight in the assignment of a land use.

Table 5a. Stocking values for all tallied trees on the four subplots and microplots

	DBH of the largest tally tree in the condition																				
	5.0+						4.0-4.9					3.0-3.9				2.0-2.9			1.0-1.9		Seedling
	DBH of tally tree						DBH of tally tree					DBH of tally tree				DBH of tally tree			DBH of tally tree		
Species	**5.0-6.9**	**4.0-4.9**	**3.0-3.9**	**2.0-2.9**	**1.0-1.9**	**Seed-ling**	**4.0-4.9**	**3.0-3.9**	**2.0-2.9**	**1.0-1.9**	**Seed-ling**	**3.0-3.9**	**2.0-2.9**	**1.0-1.9**	**Seed-ling**	**2.0-2.9**	**1.0-1.9**	**Seed-ling**	**1.0-1.9**	**Seedling**	**Seedling**
10, 12, 16, 18, 19, 70, 71, 90, 91, 93, 94, 96, 97, 992	0.7	6.9	5.2	4.0	2.6	1.2	7.9	6.2	4.6	3.0	1.4	7.6	5.7	3.7	1.8	7.4	4.9	2.3	7.2	3.5	7.0
72, 73, 844	0.6	5.6	4.3	3.3	2.1	1.0	6.4	5.1	3.8	2.5	1.1	6.3	4.6	3.0	1.4	6.1	4.0	1.9	5.9	2.9	5.7
57, 61, 95	0.7	6.2	4.7	3.6	2.3	1.1	7.1	5.6	4.2	2.7	1.3	6.9	5.1	3.3	1.6	6.7	4.4	2.1	6.5	3.2	6.3
67, 68, 105, 107, 115, 123, 126, 130, 132, 230, 232, 250	1.0	9.1	6.9	5.3	3.4	1.6	10.4	8.3	6.1	4.0	1.9	10.1	7.5	4.9	2.3	9.9	6.5	3.1	9.6	4.7	9.3
108	0.5	5.0	3.7	2.9	1.9	0.8	5.7	4.5	3.3	2.2	1.0	5.5	4.1	2.7	1.3	5.4	3.5	1.7	5.2	2.5	5.1
110	0.8	7.3	5.5	4.3	2.7	1.2	8.3	6.6	4.9	3.2	1.5	8.1	6.0	3.9	1.9	7.9	5.2	2.5	7.6	3.7	7.4
111	0.8	7.8	5.9	4.6	3.0	1.3	8.9	7.1	5.3	3.4	1.6	8.7	6.5	4.2	2.0	8.5	5.6	2.7	8.2	4.0	8.0
103, 104, 119	0.4	4.2	3.1	2.4	1.6	0.7	4.7	3.8	2.8	1.8	0.8	4.6	3.4	2.2	1.1	4.5	2.9	1.4	4.4	2.1	4.2
121	1.1	10.1	7.6	5.9	3.8	1.7	11.5	9.1	6.8	4.4	2.1	11.2	8.3	5.4	2.6	10.9	7.2	3.4	10.6	5.1	10.3
50, 51, 52, 53, 54, 55, 56, 58, 59, 62, 63, 64, 65, 66, 69, 100, 101, 102, 106, 109, 112, 113, 114, 116, 117, 118, 120, 122, 124, 127, 133, 134, 135, 137, 138, 139, 140, 142, 143, 144, 321, 322, 323, 475, 755, 756, 757, 758, 800, 803, 810, 811, 814, 823, 826, 829, 843, 846, 847, 850, 902, 990	0.5	5.0	3.8	2.9	1.9	0.9	5.7	4.6	3.4	2.2	1.0	5.6	4.1	2.7	1.3	5.4	3.6	1.7	5.3	2.6	5.1
125, 136	0.7	6.8	5.1	4.0	2.6	1.2	7.7	6.1	4.6	3.0	1.4	7.5	5.6	3.7	1.7	7.3	4.8	2.3	7.1	3.5	6.9
128	1.1	10.2	7.7	5.9	3.8	1.7	11.6	9.2	6.8	4.5	2.1	11.3	8.4	5.5	2.6	11.0	7.2	3.5	10.7	5.2	10.4

Table 5a. Stocking values for all tallied trees on the four subplots and microplots

	DBH of the largest tally tree in the condition																				
	5.0+						4.0-4.9					3.0-3.9				2.0-2.9			1.0-1.9		Seedling
	DBH of tally tree						DBH of tally tree					DBH of tally tree				DBH of tally tree			DBH of tally tree		
Species	**5.0-6.9**	**4.0-4.9**	**3.0-3.9**	**2.0-2.9**	**1.0-1.9**	**Seed-ling**	**4.0-4.9**	**3.0-3.9**	**2.0-2.9**	**1.0-1.9**	**Seed-ling**	**3.0-3.9**	**2.0-2.9**	**1.0-1.9**	**Seed-ling**	**2.0-2.9**	**1.0-1.9**	**Seed-ling**	**1.0-1.9**	**Seedling**	**Seedling**
129	0.8	7.5	5.7	4.4	2.8	1.3	8.6	6.8	5.1	3.3	1.5	8.4	6.2	4.1	1.9	8.1	5.3	2.6	7.9	3.8	7.7
131	0.9	8.3	6.3	4.8	3.1	1.4	9.4	7.5	5.6	3.6	1.7	9.2	6.8	4.5	2.1	8.9	5.9	2.8	8.7	4.2	8.4
15, 200, 201, 202, 510, 511, 512, 513, 514	0.7	6.8	5.1	4.0	2.6	1.2	7.7	6.2	4.6	3.0	1.4	7.5	5.6	3.7	1.7	7.3	4.8	2.3	7.1	3.5	6.9
43, 241	0.7	6.1	4.6	3.6	2.3	1.0	6.9	5.5	4.1	2.7	1.2	6.8	5.0	3.3	1.6	6.6	4.3	2.1	6.4	3.1	6.2
240, 260, 261, 262	0.8	7.7	5.8	4.5	2.9	1.3	8.7	7.0	5.2	3.4	1.6	8.5	6.3	4.1	2.0	8.3	5.4	2.6	8.0	3.9	7.8
11, 14, 17, 20, 21, 22, 40, 41, 42, 81, 92, 98, 231, 242, 251, 252, 263, 264	0.5	4.8	3.6	2.8	1.8	0.8	5.4	4.3	3.2	2.1	1.0	5.3	3.9	2.6	1.2	5.1	3.4	1.6	5.0	2.4	4.8
211, 212	0.4	3.8	2.9	2.2	1.4	0.6	4.3	3.4	2.5	1.7	0.8	4.2	3.1	2.0	1.0	4.1	2.7	1.3	4.0	1.9	3.8

Table 5a. Stocking values for all tallied trees on the four subplots and microplots

	DBH of the largest tally tree in the condition																				
	5.0+						4.0-4.9					3.0-3.9				2.0-2.9			1.0-1.9		Seedling
	DBH of tally tree						DBH of tally tree					DBH of tally tree				DBH of tally tree			DBH of tally tree		
Species	**5.0-6.9**	**4.0-4.9**	**3.0-3.9**	**2.0-2.9**	**1.0-1.9**	**Seed-ling**	**4.0-4.9**	**3.0-3.9**	**2.0-2.9**	**1.0-1.9**	**Seed-ling**	**3.0-3.9**	**2.0-2.9**	**1.0-1.9**	**Seed-ling**	**2.0-2.9**	**1.0-1.9**	**Seed-ling**	**1.0-1.9**	**Seedling**	**Seedling**
300, 303, 304, 310, 311, 312, 316, 317, 319, 320, 341, 356, 357, 358, 367, 381, 391, 420, 421, 424, 471, 481, 490, 491, 550, 551, 555, 561, 571, 580, 581, 582, 583, 591, 631, 653, 680, 681, 682, 683, 684, 701, 711, 760, 761, 763, 764, 765, 766, 768, 769, 770, 771, 772, 773, 774, 821, 852, 853, 854, 855, 856, 857, 858, 859, 860, 863, 864, 865, 866, 873, 874, 876, 877, 882, 883, 884, 885, 886, 887, 888, 890, 891, 895, 896, 897, 906, 907, 908, 909, 912, 913, 914, 915, 919, 920, 921, 922, 923, 924, 925, 926, 927, 928, 929, 934, 935, 936, 937, 940, 982, 986, 987, 988, 989, 991, 994, 995, 996, 997, 999	1.0	9.6	7.2	5.6	3.6	1.6	10.9	8.7	6.4	4.2	2.0	10.6	7.9	5.2	2.4	10.3	6.8	3.3	10.0	4.9	9.8

Table 5a. Stocking values for all tallied trees on the four subplots and microplots

	DBH of the largest tally tree in the condition																				
	5.0+						4.0-4.9					3.0-3.9				2.0-2.9			1.0-1.9		Seedling
	DBH of tally tree						DBH of tally tree					DBH of tally tree				DBH of tally tree			DBH of tally tree		
Species	**5.0-6.9**	**4.0-4.9**	**3.0-3.9**	**2.0-2.9**	**1.0-1.9**	**Seed-ling**	**4.0-4.9**	**3.0-3.9**	**2.0-2.9**	**1.0-1.9**	**Seed-ling**	**3.0-3.9**	**2.0-2.9**	**1.0-1.9**	**Seed-ling**	**2.0-2.9**	**1.0-1.9**	**Seed-ling**	**1.0-1.9**	**Seedling**	**Seedling**
350, 351, 352, 353, 355, 492	1.3	11.7	8.8	6.8	4.4	2.0	13.3	10.6	7.9	5.1	2.4	13.0	9.6	6.3	3.0	12.6	8.3	4.0	12.3	5.9	11.9
314, 315, 318, 330, 331, 332, 333, 334, 336, 337, 370, 371, 372, 377, 450, 451, 452, 531, 552, 712	1.2	10.9	8.2	6.3	4.1	1.8	12.4	9.8	7.3	4.8	2.2	12.1	9.0	5.9	2.8	11.7	7.7	3.7	11.4	5.5	11.1
373, 374, 375, 378, 379	1.1	10.5	7.9	6.1	4.0	1.8	12.0	9.5	7.1	4.6	2.1	11.6	8.7	5.7	2.7	11.3	7.4	3.6	11.0	5.3	10.7
360, 361, 362, 400, 401, 402, 403, 404, 405, 406, 407, 408, 409, 410, 411, 412, 413, 422, 423, 431, 500, 501, 502, 503, 504, 505, 506, 507, 508, 509, 520, 521, 522, 549, 641, 660, 661, 662, 663, 664, 801, 802, 804, 805, 806, 807, 808, 809, 812, 813, 815, 816, 817, 818, 819, 820, 822, 824, 825, 827, 828, 830, 831, 832, 833, 834, 835, 836, 837, 838, 839, 840, 841, 842, 845, 901, 931, 981, 5091, 5092, 5093	1.2	11.6	8.8	6.8	4.4	2.0	13.2	10.5	7.8	5.1	2.4	12.9	9.6	6.3	3.0	12.5	8.2	3.9	12.2	5.9	11.8

Table 5a. Stocking values for all tallied trees on the four subplots and microplots

	DBH of the largest tally tree in the condition																				
	5.0+						**4.0-4.9**					**3.0-3.9**				**2.0-2.9**			**1.0-1.9**		**Seedling**
	DBH of tally tree						**DBH of tally tree**					**DBH of tally tree**				**DBH of tally tree**			**DBH of tally tree**		
Species	**5.0-6.9**	**4.0-4.9**	**3.0-3.9**	**2.0-2.9**	**1.0-1.9**	**Seed-ling**	**4.0-4.9**	**3.0-3.9**	**2.0-2.9**	**1.0-1.9**	**Seed-ling**	**3.0-3.9**	**2.0-2.9**	**1.0-1.9**	**Seed-ling**	**2.0-2.9**	**1.0-1.9**	**Seed-ling**	**1.0-1.9**	**Seedling**	**Seedling**
600, 601, 602, 603, 604, 605, 606	1.4	12.7	9.6	7.4	4.8	2.2	14.5	11.5	8.5	5.6	2.6	14.1	10.5	6.9	3.2	13.7	9.0	4.3	13.3	6.5	12.9
220, 221, 222, 611, 690, 691, 692, 693, 694	0.7	6.8	5.2	4.0	2.6	1.2	7.8	6.2	4.6	3.0	1.4	7.6	5.6	3.7	1.7	7.4	4.9	2.3	7.2	3.5	7.0
741, 743, 746	1.2	10.9	8.3	6.4	4.1	1.9	12.5	9.9	7.3	4.8	2.2	12.1	9.0	5.9	2.8	11.8	7.8	3.7	11.5	5.6	11.1
540, 541, 542, 543, 545, 546, 547, 548, 621, 650, 651, 652, 654, 655, 657, 658, 720, 721, 722, 762, 993, 7211	1.0	9.3	7.0	5.4	3.5	1.6	10.6	8.4	6.3	4.1	1.9	10.3	7.7	5.0	2.4	10.0	6.6	3.2	9.8	4.7	9.5
950, 951, 952, 953	1.0	9.2	7.0	5.4	3.5	1.6	10.5	8.4	6.2	4.0	1.9	10.2	7.6	5.0	2.3	10.0	6.5	3.1	9.7	4.7	9.4
313, 345, 460, 461, 462, 463, 544, 729, 730, 731, 732, 740, 742, 744, 745, 747, 748, 749, 752, 753, 970, 971, 972, 973, 974, 975, 976, 977	1.2	10.8	8.1	6.3	4.1	1.8	12.3	9.8	7.2	4.7	2.2	12.0	8.9	5.8	2.7	11.6	7.6	3.7	11.3	5.5	11.0

Table 5b. Stocking values for all trees tallied on the subplot only

Species	5.0-6.9	7.0-8.9	9.0-10.9	11.0-12.9	13.0-14.9	15.0-16.9	17.0-18.9	19.0-20.9	21.0-22.9	23.0-24.9	25.0-26.9	27.0-28.9	29.0+
10, 12, 16, 18, 19, 70, 71, 90, 91, 93, 94, 96, 97, 992	0.7	1.1	1.6	2.1	2.6	3.2	3.8	4.4	5.1	5.8	6.5	7.2	8.0
72, 73, 844	0.6	1.0	1.5	2.0	2.6	3.3	4.0	4.9	5.7	6.7	7.6	8.7	9.8
57, 61, 95	0.7	0.9	1.1	1.4	1.6	1.9	2.1	2.4	2.6	2.9	3.1	3.4	3.6
67, 68, 105, 107, 115, 123, 126, 130, 132, 230, 232, 250	1.0	1.5	2.2	3.0	3.8	4.7	5.6	6.6	7.7	8.9	10.1	11.4	12.7
108	0.5	0.9	1.3	1.7	2.2	2.8	3.4	4.1	4.8	5.6	6.4	7.3	8.2
110	0.8	1.3	2.0	2.7	3.6	4.6	5.7	6.9	8.2	9.6	11.1	12.7	14.4
111	0.8	1.5	2.2	3.2	4.2	5.5	6.9	8.4	10.1	11.9	13.9	16.0	18.2
103, 104, 119	0.4	0.7	1.1	1.5	1.9	2.4	3.0	3.6	4.2	4.9	5.6	6.4	7.2
121	1.1	1.6	2.3	2.9	3.7	4.4	5.3	6.1	7.0	8.0	8.9	10.0	11.0
50, 51, 52, 53, 54, 55, 56, 58, 59, 62, 63, 64, 65, 66, 69, 100, 101, 102, 106, 109, 112, 113, 114, 116, 117, 118, 120, 122, 124, 127, 133, 134, 135, 137, 138, 139, 140, 142, 143, 144, 321, 322, 323, 475, 755, 756, 757, 758, 800, 803, 810, 811, 814, 823, 826, 829, 843, 846, 847, 850, 902, 990	0.5	1.0	1.5	2.2	2.9	3.8	4.9	6.0	7.3	8.6	10.1	11.8	13.5
125, 136	0.7	1.2	1.7	2.3	3.0	3.7	4.6	5.4	6.4	7.4	8.4	9.5	10.7
128	1.1	1.8	2.6	3.5	4.5	5.6	6.8	8.2	9.6	11.1	12.7	14.3	16.1
129	0.8	1.2	1.7	2.3	2.9	3.6	4.2	5.0	5.7	6.6	7.4	8.3	9.2
131	0.9	1.5	2.1	2.9	3.8	4.8	5.9	7.1	8.3	9.7	11.1	12.6	14.2
15, 200, 201, 202, 510, 511, 512, 513, 514	0.7	1.1	1.6	2.1	2.7	3.3	4.0	4.7	5.4	6.2	7.0	7.8	8.7
43, 241	0.7	1.1	1.6	2.3	3.0	3.8	4.7	5.7	6.8	7.9	9.2	10.5	11.8
240, 260, 261, 262	0.8	1.5	2.4	3.6	4.9	6.5	8.4	10.4	12.8	15.3	18.2	21.2	24.6
11, 14, 17, 20, 21, 22, 40, 41, 42, 81, 92, 98, 231, 242, 251, 252, 263, 264	0.5	0.8	1.2	1.6	2.1	2.6	3.2	3.8	4.5	5.2	5.9	6.7	7.5
211, 212	0.4	0.7	1.0	1.3	1.7	2.1	2.6	3.1	3.6	4.2	4.8	5.4	6.1

Table 5b. Stocking values for all trees tallied on the subplot only

Species	5.0-6.9	7.0-8.9	9.0-10.9	11.0-12.9	13.0-14.9	15.0-16.9	17.0-18.9	19.0-20.9	21.0-22.9	23.0-24.9	25.0-26.9	27.0-28.9	29.0+
300, 303, 304, 310, 311, 312, 316, 317, 319, 320, 341, 356, 357, 358, 367, 381, 391, 420, 421, 424, 471, 481, 490, 491, 550, 551, 555, 561, 571, 580, 581, 582, 583, 591, 631, 653, 680, 681, 682, 683, 684, 701, 711, 760, 761, 763, 764, 765, 766, 768, 769, 770, 771, 772, 773, 774, 821, 852, 853, 854, 855, 856, 857, 858, 859, 860, 863, 864, 865, 866, 873, 874, 876, 877, 882, 883, 884, 885, 886, 887, 888, 890, 891, 895, 896, 897, 906, 907, 908, 909, 912, 913, 914, 915, 919, 920, 921, 922, 923, 924, 925, 926, 927, 928, 929, 934, 935, 936, 937, 940, 982, 986, 987, 988, 989, 991, 994, 995, 996, 997, 999	1.0	1.6	2.2	3.0	3.8	4.6	5.5	6.5	7.5	8.6	9.7	10.9	12.1
350, 351, 352, 353, 355, 492	1.3	1.9	2.6	3.3	4.1	5.0	5.9	6.8	7.8	8.9	9.9	11.0	12.1
314, 315, 318, 330, 331, 332, 333, 334, 336, 337, 370, 371, 372, 377, 450, 451, 452, 531, 552, 712	1.2	2.0	3.0	4.2	5.6	7.2	9.0	11.0	13.1	15.4	17.8	20.5	23.3
373, 374, 375, 378, 379	1.1	1.9	3.0	4.2	5.6	7.2	9.0	11.0	13.1	15.5	18.0	20.7	23.6
360, 361, 362, 400, 401, 402, 403, 404, 405, 406, 407, 408, 409, 410, 411, 412, 413, 422, 423, 431, 500, 501, 502, 503, 504, 505, 506, 507, 508, 509, 520, 521, 522, 549, 641, 660, 661, 662, 663, 664, 801, 802, 804, 805, 806, 807, 808, 809, 812, 813, 815, 816, 817, 818, 819, 820, 822, 824, 825, 827, 828, 830, 831, 832, 833, 834, 835, 836, 837, 838, 839, 840, 841, 842, 845, 901, 931, 981, 5091, 5092, 5093	1.2	2.0	2.9	3.9	5.0	6.2	7.5	8.9	10.4	11.9	13.6	15.3	17.2
600, 601, 602, 603, 604, 605, 606	1.4	2.1	2.9	3.9	4.9	5.9	7.1	8.3	9.6	10.9	12.3	13.7	15.2
220, 221, 222, 611, 690, 691, 692, 693, 694	0.7	1.3	1.9	2.7	3.6	4.6	5.7	7.0	8.3	9.8	11.4	13.1	14.9
741, 743, 746	1.2	1.8	2.5	3.2	4.0	4.9	5.8	6.8	7.8	8.9	10.0	11.1	12.3
540, 541, 542, 543, 545, 546, 547, 548, 621, 650, 651, 652, 654, 655, 657, 658, 720, 721, 722, 762, 993, 7211	1.0	1.4	1.8	2.2	2.6	3.0	3.5	3.9	4.3	4.8	5.2	5.7	6.2
950, 951, 952, 953	1.0	1.8	2.8	4.0	5.5	7.2	9.1	11.3	13.7	16.3	19.1	22.2	25.5
313, 345, 460, 461, 462, 463, 544, 729, 730, 731, 732, 740, 742, 744, 745, 747, 748, 749, 752, 753, 970, 971, 972, 973, 974, 975, 976, 977	1.2	2.0	3.0	4.2	5.6	7.2	8.9	10.9	13.0	15.2	17.7	20.3	23.1

Table 5c. Stocking values for all trees < 7 inches, observed on the four subplots only

	DBH of the largest tally tree in the condition																				
	5.0+						4.0-4.9					3.0-3.9				2.0-2.9			1.0-1.9		Seedling
	DBH of tally tree						DBH of tally tree					DBH of tally tree				DBH of tally tree			DBH of tally tree		
Species	**5.0-6.9**	**4.0-4.9**	**3.0-3.9**	**2.0-2.9**	**1.0-1.9**	**Seed-ling**	**4.0-4.9**	**3.0-3.9**	**2.0-2.9**	**1.0-1.9**	**Seed-ling**	**3.0-3.9**	**2.0-2.9**	**1.0-1.9**	**Seed-ling**	**2.0-2.9**	**1.0-1.9**	**Seed-ling**	**1.0-1.9**	**Seedling**	**Seedling**
10, 12, 16, 18, 19, 70, 71, 90, 91, 93, 94, 96, 97, 992	0.74	0.55	0.42	0.32	0.21	0.09	0.63	0.50	0.37	0.24	0.11	0.61	0.45	0.30	0.14	0.59	0.39	0.19	0.58	0.28	0.56
72, 73, 844	0.60	0.45	0.34	0.26	0.17	0.08	0.51	0.41	0.30	0.20	0.09	0.50	0.37	0.24	0.11	0.49	0.32	0.15	0.47	0.23	0.46
57, 61, 95	0.67	0.50	0.38	0.29	0.19	0.08	0.57	0.45	0.33	0.22	0.10	0.55	0.41	0.27	0.13	0.54	0.35	0.17	0.52	0.25	0.51
67, 68, 105, 107, 115, 123, 126, 130, 132, 230, 232, 250	0.98	0.73	0.55	0.43	0.28	0.12	0.83	0.66	0.49	0.32	0.15	0.81	0.60	0.39	0.19	0.79	0.52	0.25	0.77	0.37	0.74
108	0.53	0.40	0.30	0.23	0.15	0.07	0.45	0.36	0.27	0.17	0.08	0.44	0.33	0.21	0.10	0.43	0.28	0.13	0.42	0.20	0.40
110	0.78	0.58	0.44	0.34	0.22	0.10	0.66	0.53	0.39	0.26	0.12	0.65	0.48	0.31	0.15	0.63	0.41	0.20	0.61	0.30	0.59
111	0.84	0.63	0.47	0.37	0.24	0.11	0.72	0.57	0.42	0.27	0.13	0.70	0.52	0.34	0.16	0.68	0.45	0.21	0.66	0.32	0.64
103, 104, 119	0.45	0.33	0.25	0.19	0.13	0.06	0.38	0.30	0.22	0.15	0.07	0.37	0.27	0.18	0.08	0.36	0.24	0.11	0.35	0.17	0.34
121	1.08	0.81	0.61	0.47	0.30	0.14	0.92	0.73	0.54	0.35	0.16	0.90	0.67	0.44	0.21	0.87	0.57	0.27	0.85	0.41	0.82
50, 51, 52, 53, 54, 55, 56, 58, 59, 62, 63, 64, 65, 66, 69, 100, 101, 102, 106, 109, 112, 113, 114, 116, 117, 118, 120, 122, 124, 127, 133, 134, 135, 137, 138, 139, 140, 142, 143, 144, 321, 322, 323, 475, 755, 756, 757, 758, 800, 803, 810, 811, 814, 823, 826, 829, 843, 846, 847, 850, 902, 990	0.54	0.40	0.30	0.24	0.15	0.07	0.46	0.36	0.27	0.18	0.08	0.45	0.33	0.22	0.10	0.43	0.29	0.14	0.42	0.20	0.41
125, 136	0.73	0.54	0.41	0.32	0.20	0.09	0.62	0.49	0.36	0.24	0.11	0.60	0.45	0.29	0.14	0.59	0.39	0.18	0.57	0.28	0.55

Table 5c. Stocking values for all trees < 7 inches, observed on the four subplots only

	DBH of the largest tally tree in the condition																					
	5.0+						**4.0-4.9**					**3.0-3.9**				**2.0-2.9**			**1.0-1.9**		**Seedling**
	DBH of tally tree						**DBH of tally tree**					**DBH of tally tree**				**DBH of tally tree**			**DBH of tally tree**		
Species	**5.0-6.9**	**4.0-4.9**	**3.0-3.9**	**2.0-2.9**	**1.0-1.9**	**Seed-ling**	**4.0-4.9**	**3.0-3.9**	**2.0-2.9**	**1.0-1.9**	**Seed-ling**	**3.0-3.9**	**2.0-2.9**	**1.0-1.9**	**Seed-ling**	**2.0-2.9**	**1.0-1.9**	**Seed-ling**	**1.0-1.9**	**Seedling**	**Seedling**
128	1.09	0.81	0.62	0.48	0.31	0.14	0.93	0.74	0.55	0.36	0.17	0.90	0.67	0.44	0.21	0.88	0.58	0.28	0.85	0.41	0.83
129	0.81	0.60	0.46	0.35	0.23	0.10	0.69	0.55	0.40	0.26	0.12	0.67	0.50	0.33	0.15	0.65	0.43	0.20	0.63	0.31	0.61
131	0.89	0.66	0.50	0.39	0.25	0.11	0.76	0.60	0.45	0.29	0.14	0.74	0.55	0.36	0.17	0.72	0.47	0.23	0.70	0.34	0.68
15, 200, 201, 202, 510, 511, 512, 513, 514	0.73	0.54	0.41	0.32	0.20	0.09	0.62	0.49	0.36	0.24	0.11	0.60	0.45	0.29	0.14	0.59	0.39	0.18	0.57	0.28	0.55
43, 241	0.65	0.49	0.37	0.28	0.18	0.08	0.56	0.44	0.33	0.21	0.10	0.54	0.40	0.26	0.12	0.53	0.35	0.17	0.51	0.25	0.50
240, 260, 261, 262	0.82	0.61	0.46	0.36	0.23	0.10	0.70	0.56	0.41	0.27	0.13	0.68	0.51	0.33	0.16	0.66	0.44	0.21	0.64	0.31	0.63
11, 14, 17, 20, 21, 22, 40, 41, 42, 81, 92, 98, 231, 242, 251, 252, 263, 264	0.51	0.38	0.29	0.22	0.14	0.06	0.43	0.34	0.26	0.17	0.08	0.42	0.31	0.21	0.10	0.41	0.27	0.13	0.40	0.19	0.39
211, 212	0.41	0.30	0.23	0.18	0.11	0.05	0.34	0.27	0.20	0.13	0.06	0.34	0.25	0.16	0.08	0.33	0.21	0.10	0.32	0.15	0.31

Table 5c. Stocking values for all trees < 7 inches, observed on the four subplots only

	DBH of the largest tally tree in the condition																				
	5.0+						4.0-4.9					3.0-3.9				2.0-2.9			1.0-1.9		Seedling
	DBH of tally tree						DBH of tally tree					DBH of tally tree				DBH of tally tree			DBH of tally tree		
Species	**5.0-6.9**	**4.0-4.9**	**3.0-3.9**	**2.0-2.9**	**1.0-1.9**	**Seed-ling**	**4.0-4.9**	**3.0-3.9**	**2.0-2.9**	**1.0-1.9**	**Seed-ling**	**3.0-3.9**	**2.0-2.9**	**1.0-1.9**	**Seed-ling**	**2.0-2.9**	**1.0-1.9**	**Seed-ling**	**1.0-1.9**	**Seedling**	**Seedling**
300, 303, 304, 310, 311, 312, 316, 317, 319, 320, 341, 356, 357, 358, 367, 381, 391, 420, 421, 424, 471, 481, 490, 491, 550, 551, 555, 561, 571, 580, 581, 582, 583, 591, 631, 653, 680, 681, 682, 683, 684, 701, 711, 760, 761, 763, 764, 765, 766, 768, 769, 770, 771, 772, 773, 774, 821, 852, 853, 854, 855, 856, 857, 858, 859, 860, 863, 864, 865, 866, 873, 874, 876, 877, 882, 883, 884, 885, 886, 887, 888, 890, 891, 895, 896, 897, 906, 907, 908, 909, 912, 913, 914, 915, 919, 920, 921, 922, 923, 924, 925, 926, 927, 928, 929, 934, 935, 936, 937, 940, 982, 986, 987, 988, 989, 991, 994, 995, 996, 997, 999	1.03	0.77	0.58	0.45	0.29	0.13	0.87	0.69	0.52	0.34	0.16	0.85	0.63	0.41	0.20	0.83	0.54	0.26	0.80	0.39	0.78

Table 5c. Stocking values for all trees < 7 inches, observed on the four subplots only

	DBH of the largest tally tree in the condition																				
	5.0+						**4.0-4.9**					**3.0-3.9**				**2.0-2.9**			**1.0-1.9**		**Seedling**
	DBH of tally tree						**DBH of tally tree**					**DBH of tally tree**				**DBH of tally tree**			**DBH of tally tree**		
Species	**5.0-6.9**	**4.0-4.9**	**3.0-3.9**	**2.0-2.9**	**1.0-1.9**	**Seed-ling**	**4.0-4.9**	**3.0-3.9**	**2.0-2.9**	**1.0-1.9**	**Seed-ling**	**3.0-3.9**	**2.0-2.9**	**1.0-1.9**	**Seed-ling**	**2.0-2.9**	**1.0-1.9**	**Seed-ling**	**1.0-1.9**	**Seedling**	**Seedling**
350, 351, 352, 353, 355, 492	1.25	0.93	0.71	0.55	0.35	0.16	1.07	0.85	0.63	0.41	0.19	1.04	0.77	0.50	0.24	1.01	0.66	0.32	0.98	0.48	0.95
314, 315, 318, 330, 331, 332, 333, 334, 336, 337, 370, 371, 372, 377, 450, 451, 452, 531, 552, 712	1.17	0.87	0.66	0.51	0.33	0.15	0.99	0.79	0.58	0.38	0.18	0.96	0.72	0.47	0.22	0.94	0.62	0.30	0.91	0.44	0.89
373, 374, 375, 378, 379	1.13	0.84	0.63	0.49	0.32	0.14	0.96	0.76	0.56	0.37	0.17	0.93	0.69	0.45	0.21	0.91	0.60	0.28	0.88	0.43	0.85
360, 361, 362, 400, 401, 402, 403, 404, 405, 406, 407, 408, 409, 410, 411, 412, 413, 422, 423, 431, 500, 501, 502, 503, 504, 505, 506, 507, 508, 509, 520, 521, 522, 549, 641, 660, 661, 662, 663, 664, 801, 802, 804, 805, 806, 807, 808, 809, 812, 813, 815, 816, 817, 818, 819, 820, 822, 824, 825, 827, 828, 830, 831, 832, 833, 834, 835, 836, 837, 838, 839, 840, 841, 842, 845, 901, 931, 981, 5091, 5092, 5093	1.25	0.93	0.70	0.54	0.35	0.16	1.06	0.84	0.62	0.41	0.19	1.03	0.77	0.50	0.24	1.00	0.66	0.32	0.97	0.47	0.95

Table 5c. Stocking values for all trees < 7 inches, observed on the four subplots only

	DBH of the largest tally tree in the condition																			
	5.0+						**4.0-4.9**					**3.0-3.9**				**2.0-2.9**			**1.0-1.9**		**Seedling**
	DBH of tally tree						**DBH of tally tree**					**DBH of tally tree**				**DBH of tally tree**			**DBH of tally tree**		
Species	**5.0-6.9**	**4.0-4.9**	**3.0-3.9**	**2.0-2.9**	**1.0-1.9**	**Seed-ling**	**4.0-4.9**	**3.0-3.9**	**2.0-2.9**	**1.0-1.9**	**Seed-ling**	**3.0-3.9**	**2.0-2.9**	**1.0-1.9**	**Seed-ling**	**2.0-2.9**	**1.0-1.9**	**Seed-ling**	**1.0-1.9**	**Seedling**	**Seedling**
600, 601, 602, 603, 604, 605, 606	1.36	1.01	0.77	0.59	0.38	0.17	1.16	0.92	0.68	0.44	0.21	1.13	0.84	0.55	0.26	1.10	0.72	0.34	1.07	0.52	1.03
220, 221, 222, 611, 690, 691, 692, 693, 694	0.73	0.55	0.41	0.32	0.21	0.09	0.62	0.50	0.37	0.24	0.11	0.61	0.45	0.30	0.14	0.59	0.39	0.19	0.57	0.28	0.56
741, 743, 746	1.17	0.87	0.66	0.51	0.33	0.15	1.00	0.79	0.59	0.38	0.18	0.97	0.72	0.47	0.22	0.94	0.62	0.30	0.92	0.45	0.89
540, 541, 542, 543, 545, 546, 547, 548, 621, 650, 651, 652, 654, 655, 657, 658, 720, 721, 722, 762, 993, 7211	1.00	0.74	0.56	0.43	0.28	0.13	0.85	0.67	0.50	0.33	0.15	0.83	0.61	0.40	0.19	0.80	0.53	0.25	0.78	0.38	0.76
950, 951, 952, 953	0.99	0.74	0.56	0.43	0.28	0.13	0.84	0.67	0.50	0.32	0.15	0.82	0.61	0.40	0.19	0.80	0.52	0.25	0.77	0.38	0.75
313, 345, 460, 461, 462, 463, 544, 729, 730, 731, 732, 740, 742, 744, 745, 747, 748, 749, 752, 753, 970, 971, 972, 973, 974, 975, 976, 977	1.16	0.86	0.65	0.50	0.32	0.15	0.98	0.78	0.58	0.38	0.18	0.96	0.71	0.47	0.22	0.93	0.61	0.29	0.90	0.44	0.88

Table 5d. Stocking values for all trees 5.0 inches and greater observed on the four subplots only													
Species	**5.0-6.9**	**7.0-8.9**	**9.0-10.9**	**11.0-12.9**	**13.0-14.9**	**15.0-16.9**	**17.0-18.9**	**19.0-20.9**	**21.0-22.9**	**23.0-24.9**	**25.0-26.9**	**27.0-28.9**	**29.0+**
10, 12, 16, 18, 19, 70, 71, 90, 91, 93, 94, 96, 97, 992	0.7	1.1	1.6	2.1	2.6	3.2	3.8	4.4	5.1	5.8	6.5	7.2	8.0
72, 73, 844	0.6	1.0	1.5	2.0	2.6	3.3	4.0	4.9	5.7	6.7	7.6	8.7	9.8
57, 61, 95	0.7	0.9	1.1	1.4	1.6	1.9	2.1	2.4	2.6	2.9	3.1	3.4	3.6
67, 68, 105, 107, 115, 123, 126, 130, 132, 230, 232, 250	1.0	1.5	2.2	3.0	3.8	4.7	5.6	6.6	7.7	8.9	10.1	11.4	12.7
108	0.5	0.9	1.3	1.7	2.2	2.8	3.4	4.1	4.8	5.6	6.4	7.3	8.2
110	0.8	1.3	2.0	2.7	3.6	4.6	5.7	6.9	8.2	9.6	11.1	12.7	14.4
111	0.8	1.5	2.2	3.2	4.2	5.5	6.9	8.4	10.1	11.9	13.9	16.0	18.2
103, 104, 119	0.4	0.7	1.1	1.5	1.9	2.4	3.0	3.6	4.2	4.9	5.6	6.4	7.2
121	1.1	1.6	2.3	2.9	3.7	4.4	5.3	6.1	7.0	8.0	8.9	10.0	11.0
50, 51, 52, 53, 54, 55, 56, 58, 59, 62, 63, 64, 65, 66, 69, 100, 101, 102, 106, 109, 112, 113, 114, 116, 117, 118, 120, 122, 124, 127, 133, 134, 135, 137, 138, 139, 140, 142, 143, 144, 321, 322, 323, 475, 755, 756, 757, 758, 800, 803, 810, 811, 814, 823, 826, 829, 843, 846, 847, 850, 902, 990	0.5	1.0	1.5	2.2	2.9	3.8	4.9	6.0	7.3	8.6	10.1	11.8	13.5
125, 136	0.7	1.2	1.7	2.3	3.0	3.7	4.6	5.4	6.4	7.4	8.4	9.5	10.7
128	1.1	1.8	2.6	3.5	4.5	5.6	6.8	8.2	9.6	11.1	12.7	14.3	16.1
129	0.8	1.2	1.7	2.3	2.9	3.6	4.2	5.0	5.7	6.6	7.4	8.3	9.2
131	0.9	1.5	2.1	2.9	3.8	4.8	5.9	7.1	8.3	9.7	11.1	12.6	14.2
15, 200, 201, 202, 510, 511, 512, 513, 514	0.7	1.1	1.6	2.1	2.7	3.3	4.0	4.7	5.4	6.2	7.0	7.8	8.7
43, 241	0.7	1.1	1.6	2.3	3.0	3.8	4.7	5.7	6.8	7.9	9.2	10.5	11.8
240, 260, 261, 262	0.8	1.5	2.4	3.6	4.9	6.5	8.4	10.4	12.8	15.3	18.2	21.2	24.6
11, 14, 17, 20, 21, 22, 40, 41, 42, 81, 92, 98, 231, 242, 251, 252, 263, 264	0.5	0.8	1.2	1.6	2.1	2.6	3.2	3.8	4.5	5.2	5.9	6.7	7.5
211, 212	0.4	0.7	1.0	1.3	1.7	2.1	2.6	3.1	3.6	4.2	4.8	5.4	6.1

Table 5d. Stocking values for all trees 5.0 inches and greater observed on the four subplots only

Species	5.0-6.9	7.0-8.9	9.0-10.9	11.0-12.9	13.0-14.9	15.0-16.9	17.0-18.9	19.0-20.9	21.0-22.9	23.0-24.9	25.0-26.9	27.0-28.9	29.0+
300, 303, 304, 310, 311, 312, 316, 317, 319, 320, 341, 356, 357, 358, 367, 381, 391, 420, 421, 424, 471, 481, 490, 491, 550, 551, 555, 561, 571, 580, 581, 582, 583, 591, 631, 653, 680, 681, 682, 683, 684, 701, 711, 760, 761, 763, 764, 765, 766, 768, 769, 770, 771, 772, 773, 774, 821, 852, 853, 854, 855, 856, 857, 858, 859, 860, 863, 864, 865, 866, 873, 874, 876, 877, 882, 883, 884, 885, 886, 887, 888, 890, 891, 895, 896, 897, 906, 907, 908, 909, 912, 913, 914, 915, 919, 920, 921, 922, 923, 924, 925, 926, 927, 928, 929, 934, 935, 936, 937, 940, 982, 986, 987, 988, 989, 991, 994, 995, 996, 997, 999	1.0	1.6	2.2	3.0	3.8	4.6	5.5	6.5	7.5	8.6	9.7	10.9	12.1
350, 351, 352, 353, 355, 492	1.3	1.9	2.6	3.3	4.1	5.0	5.9	6.8	7.8	8.9	9.9	11.0	12.1
314, 315, 318, 330, 331, 332, 333, 334, 336, 337, 370, 371, 372, 377, 450, 451, 452, 531, 552, 712	1.2	2.0	3.0	4.2	5.6	7.2	9.0	11.0	13.1	15.4	17.8	20.5	23.3
373, 374, 375, 378, 379	1.1	1.9	3.0	4.2	5.6	7.2	9.0	11.0	13.1	15.5	18.0	20.7	23.6
360, 361, 362, 400, 401, 402, 403, 404, 405, 406, 407, 408, 409, 410, 411, 412, 413, 422, 423, 431, 500, 501, 502, 503, 504, 505, 506, 507, 508, 509, 520, 521, 522, 549, 641, 660, 661, 662, 663, 664, 801, 802, 804, 805, 806, 807, 808, 809, 812, 813, 815, 816, 817, 818, 819, 820, 822, 824, 825, 827, 828, 830, 831, 832, 833, 834, 835, 836, 837, 838, 839, 840, 841, 842, 845, 901, 931, 981, 5091, 5092, 5093	1.2	2.0	2.9	3.9	5.0	6.2	7.5	8.9	10.4	11.9	13.6	15.3	17.2
600, 601, 602, 603, 604, 605, 606	1.4	2.1	2.9	3.9	4.9	5.9	7.1	8.3	9.6	10.9	12.3	13.7	15.2
220, 221, 222, 611, 690, 691, 692, 693, 694	0.7	1.3	1.9	2.7	3.6	4.6	5.7	7.0	8.3	9.8	11.4	13.1	14.9
741, 743, 746	1.2	1.8	2.5	3.2	4.0	4.9	5.8	6.8	7.8	8.9	10.0	11.1	12.3
540, 541, 542, 543, 545, 546, 547, 548, 621, 650, 651, 652, 654, 655, 657, 658, 720, 721, 722, 762, 993, 7211	1.0	1.4	1.8	2.2	2.6	3.0	3.5	3.9	4.3	4.8	5.2	5.7	6.2
950, 951, 952, 953	1.0	1.8	2.8	4.0	5.5	7.2	9.1	11.3	13.7	16.3	19.1	22.2	25.5
313, 345, 460, 461, 462, 463, 544, 729, 730, 731, 732, 740, 742, 744, 745, 747, 748, 749, 752, 753, 970, 971, 972, 973, 974, 975, 976, 977	1.2	2.0	3.0	4.2	5.6	7.2	8.9	10.9	13.0	15.2	17.7	20.3	23.1

Table 5e. Stocking values for all trees < 7 inches observed on one acre

	DBH of the largest tally tree in the condition																				
	5.0+						4.0-4.9					3.0-3.9				2.0-2.9			1.0-1.9		Seedling
	DBH of tally tree						DBH of tally tree					DBH of tally tree				DBH of tally tree			DBH of tally tree		
Species	**5.0-6.9**	**4.0-4.9**	**3.0-3.9**	**2.0-2.9**	**1.0-1.9**	**Seed-ling**	**4.0-4.9**	**3.0-3.9**	**2.0-2.9**	**1.0-1.9**	**Seed-ling**	**3.0-3.9**	**2.0-2.9**	**1.0-1.9**	**Seed-ling**	**2.0-2.9**	**1.0-1.9**	**Seed-ling**	**1.0-1.9**	**Seedling**	**Seedling**
10, 12, 16, 18, 19, 70, 71, 90, 91, 93, 94, 96, 97, 992	0.12	0.092	0.069	0.054	0.035	0.016	0.105	0.083	0.062	0.040	0.019	0.102	0.076	0.050	0.023	0.099	0.065	0.031	0.096	0.047	0.094
72, 73, 844	0.10	0.075	0.057	0.044	0.028	0.013	0.086	0.068	0.050	0.033	0.015	0.083	0.062	0.041	0.019	0.081	0.053	0.025	0.079	0.038	0.076
57, 61, 95	0.11	0.083	0.063	0.048	0.031	0.014	0.094	0.075	0.056	0.036	0.017	0.092	0.068	0.045	0.021	0.089	0.059	0.028	0.087	0.042	0.084
67, 68, 105, 107, 115, 123, 126, 130, 132, 230, 232, 250	0.16	0.122	0.092	0.071	0.046	0.021	0.139	0.110	0.082	0.053	0.025	0.135	0.100	0.066	0.031	0.131	0.086	0.041	0.128	0.062	0.124
108	0.09	0.066	0.050	0.039	0.025	0.011	0.075	0.060	0.044	0.029	0.013	0.073	0.055	0.036	0.017	0.071	0.047	0.022	0.069	0.034	0.067
110	0.13	0.097	0.073	0.057	0.037	0.016	0.111	0.088	0.065	0.043	0.020	0.108	0.080	0.052	0.025	0.105	0.069	0.033	0.102	0.049	0.099
111	0.14	0.104	0.079	0.061	0.039	0.018	0.119	0.095	0.070	0.046	0.021	0.116	0.086	0.056	0.027	0.113	0.074	0.036	0.110	0.053	0.107
103, 104, 119	0.07	0.055	0.042	0.032	0.021	0.009	0.063	0.050	0.037	0.024	0.011	0.062	0.046	0.030	0.014	0.060	0.039	0.019	0.058	0.028	0.056
121	0.18	0.134	0.102	0.079	0.051	0.023	0.153	0.122	0.090	0.059	0.027	0.149	0.111	0.073	0.034	0.145	0.095	0.046	0.141	0.068	0.137
50, 51, 52, 53, 54, 55, 56, 58, 59, 62, 63, 64, 65, 66, 69, 100, 101, 102, 106, 109, 112, 113, 114, 116, 117, 118, 120, 122, 124, 127, 133, 134, 135, 137, 138, 139, 140, 142, 143, 144, 321, 322, 323, 475, 755, 756, 757, 758, 800, 803, 810, 811, 814, 823, 826, 829, 843, 846, 847, 850, 902, 990	0.09	0.067	0.051	0.039	0.025	0.011	0.077	0.061	0.045	0.029	0.014	0.074	0.055	0.036	0.017	0.072	0.048	0.023	0.070	0.034	0.068
125, 136	0.12	0.090	0.068	0.053	0.034	0.015	0.103	0.082	0.061	0.040	0.018	0.100	0.075	0.049	0.023	0.098	0.064	0.031	0.095	0.046	0.092

Table 5e. Stocking values for all trees < 7 inches observed on one acre

	DBH of the largest tally tree in the condition																				
	5.0+						**4.0-4.9**					**3.0-3.9**				**2.0-2.9**			**1.0-1.9**		**Seedling**
	DBH of tally tree						**DBH of tally tree**					**DBH of tally tree**				**DBH of tally tree**			**DBH of tally tree**		
Species	**5.0-6.9**	**4.0-4.9**	**3.0-3.9**	**2.0-2.9**	**1.0-1.9**	**Seed-ling**	**4.0-4.9**	**3.0-3.9**	**2.0-2.9**	**1.0-1.9**	**Seed-ling**	**3.0-3.9**	**2.0-2.9**	**1.0-1.9**	**Seed-ling**	**2.0-2.9**	**1.0-1.9**	**Seed-ling**	**1.0-1.9**	**Seedling**	**Seedling**
128	0.18	0.136	0.103	0.079	0.051	0.023	0.155	0.123	0.091	0.059	0.028	0.151	0.112	0.073	0.035	0.147	0.096	0.046	0.142	0.069	0.138
129	0.13	0.100	0.076	0.059	0.038	0.017	0.114	0.091	0.067	0.044	0.020	0.111	0.083	0.054	0.026	0.108	0.071	0.034	0.105	0.051	0.102
131	0.15	0.110	0.083	0.065	0.042	0.019	0.126	0.100	0.074	0.048	0.023	0.123	0.091	0.060	0.028	0.119	0.078	0.038	0.116	0.056	0.113
15, 200, 201, 202, 510, 511, 512, 513, 514	0.12	0.090	0.068	0.053	0.034	0.015	0.103	0.082	0.061	0.040	0.018	0.100	0.075	0.049	0.023	0.098	0.064	0.031	0.095	0.046	0.092
43, 241	0.11	0.081	0.061	0.047	0.031	0.014	0.093	0.074	0.055	0.036	0.017	0.090	0.067	0.044	0.021	0.088	0.058	0.028	0.085	0.041	0.083
240, 260, 261, 262	0.14	0.102	0.077	0.060	0.039	0.017	0.117	0.093	0.069	0.045	0.021	0.114	0.084	0.055	0.026	0.110	0.073	0.035	0.107	0.052	0.104
11, 14, 17, 20, 21, 22, 40, 41, 42, 81, 92, 98, 231, 242, 251, 252, 263, 264	0.09	0.063	0.048	0.037	0.024	0.011	0.072	0.057	0.043	0.028	0.013	0.070	0.052	0.034	0.016	0.068	0.045	0.022	0.067	0.032	0.065
211, 212	0.07	0.050	0.038	0.029	0.019	0.009	0.057	0.046	0.034	0.022	0.010	0.056	0.042	0.027	0.013	0.054	0.036	0.017	0.053	0.026	0.051

Table 5e. Stocking values for all trees < 7 inches observed on one acre

	DBH of the largest tally tree in the condition																				
	5.0+						4.0-4.9					3.0-3.9				2.0-2.9			1.0-1.9		Seedling
	DBH of tally tree						DBH of tally tree					DBH of tally tree				DBH of tally tree			DBH of tally tree		
Species	**5.0-6.9**	**4.0-4.9**	**3.0-3.9**	**2.0-2.9**	**1.0-1.9**	**Seed-ling**	**4.0-4.9**	**3.0-3.9**	**2.0-2.9**	**1.0-1.9**	**Seed-ling**	**3.0-3.9**	**2.0-2.9**	**1.0-1.9**	**Seed-ling**	**2.0-2.9**	**1.0-1.9**	**Seed-ling**	**1.0-1.9**	**Seedling**	**Seedling**
300, 303, 304, 310, 311, 312, 316, 317, 319, 320, 341, 356, 357, 358, 367, 381, 391, 420, 421, 424, 471, 481, 490, 491, 550, 551, 555, 561, 571, 580, 581, 582, 583, 591, 631, 653, 680, 681, 682, 683, 684, 701, 711, 760, 761, 763, 764, 765, 766, 768, 769, 770, 771, 772, 773, 774, 821, 852, 853, 854, 855, 856, 857, 858, 859, 860, 863, 864, 865, 866, 873, 874, 876, 877, 882, 883, 884, 885, 886, 887, 888, 890, 891, 895, 896, 897, 906, 907, 908, 909, 912, 913, 914, 915, 919, 920, 921, 922, 923, 924, 925, 926, 927, 928, 929, 934, 935, 936, 937, 940, 982, 986, 987, 988, 989, 991, 994, 995, 996, 997, 999	0.17	0.128	0.097	0.075	0.048	0.022	0.146	0.116	0.086	0.056	0.026	0.142	0.105	0.069	0.033	0.138	0.091	0.043	0.134	0.065	0.130

Table 5e. Stocking values for all trees < 7 inches observed on one acre

	DBH of the largest tally tree in the condition																				
	5.0+						4.0-4.9					3.0-3.9				2.0-2.9			1.0-1.9		Seedling
	DBH of tally tree						DBH of tally tree					DBH of tally tree				DBH of tally tree			DBH of tally tree		
Species	**5.0-6.9**	**4.0-4.9**	**3.0-3.9**	**2.0-2.9**	**1.0-1.9**	**Seed-ling**	**4.0-4.9**	**3.0-3.9**	**2.0-2.9**	**1.0-1.9**	**Seed-ling**	**3.0-3.9**	**2.0-2.9**	**1.0-1.9**	**Seed-ling**	**2.0-2.9**	**1.0-1.9**	**Seed-ling**	**1.0-1.9**	**Seedling**	**Seedling**
350, 351, 352, 353, 355, 492	0.21	0.156	0.118	0.091	0.059	0.026	0.178	0.141	0.105	0.068	0.032	0.173	0.128	0.084	0.040	0.168	0.111	0.053	0.163	0.079	0.159
314, 315, 318, 330, 331, 332, 333, 334, 336, 337, 370, 371, 372, 377, 450, 451, 452, 531, 552, 712	0.19	0.145	0.110	0.085	0.055	0.025	0.165	0.131	0.097	0.063	0.030	0.161	0.120	0.078	0.037	0.156	0.103	0.049	0.152	0.074	0.148
373, 374, 375, 378, 379	0.19	0.140	0.106	0.082	0.053	0.024	0.160	0.127	0.094	0.061	0.028	0.155	0.115	0.076	0.036	0.151	0.099	0.047	0.147	0.071	0.142
360, 361, 362, 400, 401, 402, 403, 404, 405, 406, 407, 408, 409, 410, 411, 412, 413, 422, 423, 431, 500, 501, 502, 503, 504, 505, 506, 507, 508, 509, 520, 521, 522, 549, 641, 660, 661, 662, 663, 664, 801, 802, 804, 805, 806, 807, 808, 809, 812, 813, 815, 816, 817, 818, 819, 820, 822, 824, 825, 827, 828, 830, 831, 832, 833, 834, 835, 836, 837, 838, 839, 840, 841, 842, 845, 901, 931, 981, 5091, 5092, 5093	0.21	0.155	0.117	0.090	0.058	0.026	0.176	0.140	0.104	0.068	0.032	0.172	0.128	0.084	0.039	0.167	0.110	0.053	0.162	0.079	0.158

Table 5e. Stocking values for all trees < 7 inches observed on one acre

	DBH of the largest tally tree in the condition																				
	5.0+						4.0-4.9					3.0-3.9				2.0-2.9			1.0-1.9		Seedling
	DBH of tally tree						DBH of tally tree					DBH of tally tree				DBH of tally tree			DBH of tally tree		
Species	**5.0-6.9**	**4.0-4.9**	**3.0-3.9**	**2.0-2.9**	**1.0-1.9**	**Seed-ling**	**4.0-4.9**	**3.0-3.9**	**2.0-2.9**	**1.0-1.9**	**Seed-ling**	**3.0-3.9**	**2.0-2.9**	**1.0-1.9**	**Seed-ling**	**2.0-2.9**	**1.0-1.9**	**Seed-ling**	**1.0-1.9**	**Seedling**	**Seedling**
600, 601, 602, 603, 604, 605, 606	0.23	0.169	0.128	0.099	0.064	0.029	0.193	0.153	0.114	0.074	0.034	0.188	0.140	0.091	0.043	0.183	0.120	0.057	0.178	0.086	0.172
220, 221, 222, 611, 690, 691, 692, 693, 694	0.12	0.091	0.069	0.053	0.034	0.015	0.104	0.083	0.061	0.040	0.019	0.101	0.075	0.049	0.023	0.098	0.065	0.031	0.096	0.046	0.093
741, 743, 746	0.20	0.146	0.110	0.085	0.055	0.025	0.166	0.132	0.098	0.064	0.030	0.162	0.120	0.079	0.037	0.157	0.103	0.049	0.153	0.074	0.148
540, 541, 542, 543, 545, 546, 547, 548, 621, 650, 651, 652, 654, 655, 657, 658, 720, 721, 722, 762, 993, 7211	0.17	0.124	0.094	0.072	0.047	0.021	0.141	0.112	0.083	0.054	0.025	0.138	0.102	0.067	0.032	0.134	0.088	0.042	0.130	0.063	0.126
950, 951, 952, 953	0.16	0.123	0.093	0.072	0.046	0.021	0.140	0.111	0.083	0.054	0.025	0.136	0.101	0.066	0.031	0.133	0.087	0.042	0.129	0.063	0.125
313, 345, 460, 461, 462, 463, 544, 729, 730, 731, 732, 740, 742, 744, 745, 747, 748, 749, 752, 753, 970, 971, 972, 973, 974, 975, 976, 977	0.19	0.143	0.109	0.084	0.054	0.024	0.164	0.130	0.097	0.063	0.029	0.159	0.118	0.078	0.037	0.155	0.102	0.049	0.151	0.073	0.146

Table 5f. Stocking values for all trees 5.0 inches and greater observed on one acre													
Species	**5.0-6.9**	**7.0-8.9**	**9.0-10.9**	**11.0-12.9**	**13.0-14.9**	**15.0-16.9**	**17.0-18.9**	**19.0-20.9**	**21.0-22.9**	**23.0-24.9**	**25.0-26.9**	**27.0-28.9**	**29.0+**
10, 12, 16, 18, 19, 70, 71, 90, 91, 93, 94, 96, 97, 992	0.12	0.19	0.26	0.34	0.43	0.53	0.63	0.73	0.84	0.96	1.08	1.20	1.33
72, 73, 844	0.10	0.17	0.24	0.33	0.44	0.55	0.67	0.81	0.95	1.11	1.27	1.45	1.63
57, 61, 95	0.11	0.15	0.19	0.23	0.27	0.31	0.35	0.39	0.43	0.48	0.52	0.56	0.60
67, 68, 105, 107, 115, 123, 126, 130, 132, 230, 232, 250	0.16	0.26	0.37	0.49	0.63	0.78	0.94	1.11	1.29	1.48	1.68	1.89	2.11
108	0.09	0.14	0.21	0.29	0.37	0.47	0.57	0.69	0.81	0.94	1.07	1.22	1.37
110	0.13	0.22	0.33	0.46	0.60	0.77	0.95	1.15	1.37	1.60	1.85	2.12	2.40
111	0.14	0.24	0.37	0.53	0.71	0.91	1.14	1.40	1.68	1.98	2.31	2.66	3.04
103, 104, 119	0.07	0.12	0.18	0.25	0.32	0.41	0.50	0.60	0.70	0.82	0.94	1.07	1.20
121	0.18	0.27	0.38	0.49	0.61	0.74	0.88	1.02	1.17	1.33	1.49	1.66	1.83
50, 51, 52, 53, 54, 55, 56, 58, 59, 62, 63, 64, 65, 66, 69, 100, 101, 102, 106, 109, 112, 113, 114, 116, 117, 118, 120, 122, 124, 127, 133, 134, 135, 137, 138, 139, 140, 142, 143, 144, 321, 322, 323, 475, 755, 756, 757, 758, 800, 803, 810, 811, 814, 823, 826, 829, 843, 846, 847, 850, 902, 990	0.09	0.16	0.25	0.36	0.49	0.64	0.81	1.00	1.21	1.44	1.69	1.96	2.25
125, 136	0.12	0.20	0.28	0.39	0.50	0.62	0.76	0.91	1.06	1.23	1.40	1.59	1.78
128	0.18	0.29	0.43	0.58	0.75	0.94	1.14	1.36	1.60	1.84	2.11	2.39	2.68
129	0.13	0.21	0.29	0.38	0.48	0.59	0.71	0.83	0.96	1.09	1.23	1.38	1.53
131	0.15	0.24	0.36	0.49	0.64	0.80	0.98	1.18	1.39	1.61	1.85	2.10	2.36
15, 200, 201, 202, 510, 511, 512, 513, 514	0.12	0.19	0.27	0.35	0.45	0.55	0.66	0.78	0.90	1.03	1.16	1.30	1.45
43, 241	0.11	0.18	0.27	0.38	0.50	0.64	0.79	0.95	1.13	1.32	1.53	1.74	1.97
240, 260, 261, 262	0.14	0.25	0.40	0.59	0.82	1.09	1.39	1.74	2.13	2.56	3.03	3.54	4.10
11, 14, 17, 20, 21, 22, 40, 41, 42, 81, 92, 98, 231, 242, 251, 252, 263, 264	0.09	0.14	0.20	0.27	0.35	0.44	0.53	0.64	0.75	0.86	0.98	1.11	1.25
211, 212	0.07	0.11	0.16	0.22	0.28	0.35	0.43	0.51	0.60	0.69	0.79	0.90	1.01

Table 5f. Stocking values for all trees 5.0 inches and greater observed on one acre

Species	5.0-6.9	7.0-8.9	9.0-10.9	11.0-12.9	13.0-14.9	15.0-16.9	17.0-18.9	19.0-20.9	21.0-22.9	23.0-24.9	25.0-26.9	27.0-28.9	29.0+
300, 303, 304, 310, 311, 312, 316, 317, 319, 320, 341, 356, 357, 358, 367, 381, 391, 420, 421, 424, 471, 481, 490, 491, 550, 551, 555, 561, 571, 580, 581, 582, 583, 591, 631, 653, 680, 681, 682, 683, 684, 701, 711, 760, 761, 763, 764, 765, 766, 768, 769, 770, 771, 772, 773, 774, 821, 852, 853, 854, 855, 856, 857, 858, 859, 860, 863, 864, 865, 866, 873, 874, 876, 877, 882, 883, 884, 885, 886, 887, 888, 890, 891, 895, 896, 897, 906, 907, 908, 909, 912, 913, 914, 915, 919, 920, 921, 922, 923, 924, 925, 926, 927, 928, 929, 934, 935, 936, 937, 940, 982, 986, 987, 988, 989, 991, 994, 995, 996, 997, 999	0.17	0.27	0.37	0.49	0.63	0.77	0.92	1.08	1.25	1.43	1.62	1.81	2.01
350, 351, 352, 353, 355, 492	0.21	0.31	0.43	0.56	0.69	0.83	0.98	1.14	1.31	1.48	1.65	1.83	2.02
314, 315, 318, 330, 331, 332, 333, 334, 336, 337, 370, 371, 372, 377, 450, 451, 452, 531, 552, 712	0.19	0.33	0.50	0.71	0.94	1.21	1.50	1.83	2.18	2.56	2.97	3.41	3.88
373, 374, 375, 378, 379	0.19	0.32	0.49	0.70	0.93	1.20	1.50	1.83	2.19	2.58	3.00	3.45	3.93
360, 361, 362, 400, 401, 402, 403, 404, 405, 406, 407, 408, 409, 410, 411, 412, 413, 422, 423, 431, 500, 501, 502, 503, 504, 505, 506, 507, 508, 509, 520, 521, 522, 549, 641, 660, 661, 662, 663, 664, 801, 802, 804, 805, 806, 807, 808, 809, 812, 813, 815, 816, 817, 818, 819, 820, 822, 824, 825, 827, 828, 830, 831, 832, 833, 834, 835, 836, 837, 838, 839, 840, 841, 842, 845, 901, 931, 981, 5091, 5092, 5093	0.21	0.33	0.48	0.64	0.83	1.03	1.24	1.48	1.73	1.99	2.27	2.56	2.86
600, 601, 602, 603, 604, 605, 606	0.23	0.35	0.49	0.64	0.81	0.99	1.18	1.38	1.60	1.82	2.05	2.29	2.54
220, 221, 222, 611, 690, 691, 692, 693, 694	0.12	0.21	0.32	0.45	0.60	0.77	0.95	1.16	1.39	1.63	1.90	2.18	2.48
741, 743, 746	0.20	0.30	0.41	0.54	0.67	0.82	0.97	1.13	1.30	1.48	1.66	1.85	2.05
540, 541, 542, 543, 545, 546, 547, 548, 621, 650, 651, 652, 654, 655, 657, 658, 720, 721, 722, 762, 993, 7211	0.17	0.23	0.30	0.36	0.43	0.50	0.58	0.65	0.72	0.80	0.87	0.95	1.03
950, 951, 952, 953	0.16	0.29	0.46	0.67	0.91	1.20	1.52	1.88	2.28	2.71	3.19	3.70	4.26
313, 345, 460, 461, 462, 463, 544, 729, 730, 731, 732, 740, 742, 744, 745, 747, 748, 749, 752, 753, 970, 971, 972, 973, 974, 975, 976, 977	0.19	0.33	0.50	0.70	0.93	1.19	1.49	1.81	2.16	2.54	2.95	3.38	3.85

Table 5g. Minimum number of trees per acre for forest land based on largest tally tree

Species	**DBH of largest tally tree**																	
	Seed-ling	**1.0-1.9**	**2.0-2.9**	**3.0-3.9**	**4.0-4.9**	**5.0-6.9**	**7.0-8.9**	**9.0-10.9**	**11.0-12.9**	**13.0-14.9**	**15.0-16.9**	**17.0-18.9**	**19.0-20.9**	**21.0-22.9**	**23.0-24.9**	**25.0-26.9**	**27.0-28.9**	**29.0+**
10, 12, 16, 18, 19, 70, 71, 90, 91, 93, 94, 96, 97, 992	106.9	103.8	100.9	98.1	95.5	81.2	53.0	38.1	29.1	23.2	19.0	16.0	13.7	11.9	10.4	9.3	8.3	7.5
72, 73, 844	130.8	127.0	123.4	120.0	116.8	99.3	60.3	41.0	29.9	22.9	18.2	14.8	12.4	10.5	9.0	7.9	6.9	6.1
57, 61, 95	118.7	115.3	112.0	108.9	106.0	90.1	66.6	52.7	43.5	37.0	32.2	28.4	25.5	23.0	21.0	19.3	17.9	16.6
67, 68, 105, 107, 115, 123, 126, 130, 132, 230, 232, 250	80.6	78.3	76.1	74.0	72.0	61.2	38.7	27.2	20.3	15.9	12.9	10.7	9.0	7.8	6.8	5.9	5.3	4.7
108	148.4	144.1	140.0	136.2	132.6	112.7	69.1	47.3	34.7	26.7	21.3	17.4	14.6	12.4	10.7	9.3	8.2	7.3
110	101.0	98.1	95.3	92.7	90.2	76.7	45.6	30.4	21.9	16.5	13.0	10.5	8.7	7.3	6.2	5.4	4.7	4.2
111	93.9	91.2	88.6	86.1	83.8	71.3	41.1	26.9	19.0	14.1	10.9	8.7	7.1	6.0	5.0	4.3	3.8	3.3
103, 104, 119	177.2	172.0	167.2	162.6	158.2	134.5	81.8	55.6	40.5	31.1	24.7	20.1	16.8	14.2	12.2	10.6	9.4	8.3
121	73.0	70.9	68.9	67.0	65.2	55.4	36.6	26.6	20.4	16.4	13.5	11.4	9.8	8.5	7.5	6.7	6.0	5.5
50, 51, 52, 53, 54, 55, 56, 58, 59, 62, 63, 64, 65, 66, 69, 100, 101, 102, 106, 109, 112, 113, 114, 116, 117, 118, 120, 122, 124, 127, 133, 134, 135, 137, 138, 139, 140, 142, 143, 144, 321, 322, 323, 475, 755, 756, 757, 758, 800, 803, 810, 811, 814, 823, 826, 829, 843, 846, 847, 850, 902, 990	146.4	142.1	138.1	134.3	130.7	111.1	62.5	40.0	27.8	20.4	15.6	12.3	10.0	8.3	6.9	5.9	5.1	4.4
125, 136	108.5	105.4	102.4	99.6	96.9	82.4	51.0	35.1	25.9	20.0	16.0	13.2	11.0	9.4	8.1	7.1	6.3	5.6
128	72.3	70.2	68.2	66.4	64.6	54.9	34.0	23.4	17.3	13.3	10.7	8.8	7.4	6.3	5.4	4.7	4.2	3.7
129	97.8	95.0	92.3	89.8	87.4	74.3	48.1	34.3	26.1	20.7	16.9	14.1	12.1	10.4	9.2	8.1	7.3	6.5
131	88.9	86.3	83.9	81.5	79.4	67.5	41.1	28.0	20.5	15.7	12.5	10.2	8.5	7.2	6.2	5.4	4.8	4.2

Table 5g. Minimum number of trees per acre for forest land based on largest tally tree																		
	DBH of largest tally tree																	
Species	**Seed-ling**	**1.0-1.9**	**2.0-2.9**	**3.0-3.9**	**4.0-4.9**	**5.0-6.9**	**7.0-8.9**	**9.0-10.9**	**11.0-12.9**	**13.0-14.9**	**15.0-16.9**	**17.0-18.9**	**19.0-20.9**	**21.0-22.9**	**23.0-24.9**	**25.0-26.9**	**27.0-28.9**	**29.0+**
15, 200, 201, 202, 510, 511, 512, 513, 514	108.5	105.3	102.4	99.6	96.9	82.4	52.9	37.5	28.3	22.3	18.2	15.2	12.9	11.1	9.7	8.6	7.7	6.9
43, 241	120.9	117.4	114.1	111.0	108.0	91.8	54.7	36.6	26.4	20.0	15.7	12.7	10.5	8.9	7.6	6.6	5.7	5.1
240, 260, 261, 262	96.0	93.2	90.6	88.1	85.7	72.9	39.7	24.8	16.9	12.2	9.2	7.2	5.7	4.7	3.9	3.3	2.8	2.4
11, 14, 17, 20, 21, 22, 40, 41, 42, 81, 92, 98, 231, 242, 251, 252, 263, 264	154.8	150.3	146.1	142.0	138.2	117.5	72.7	50.1	36.9	28.5	22.8	18.8	15.7	13.4	11.6	10.2	9.0	8.0
211, 212	195.0	189.3	184.0	178.9	174.1	148.0	91.3	62.7	46.2	35.7	28.5	23.4	19.6	16.7	14.4	12.6	11.1	9.9
300, 303, 304, 310, 311, 312, 316, 317, 319, 320, 341, 356, 357, 358, 367, 381, 391, 420, 421, 424, 471, 481, 490, 491, 550, 551, 555, 561, 571, 580, 581, 582, 583, 591, 631, 653, 680, 681, 682, 683, 684, 701, 711, 760, 761, 763, 764, 765, 766, 768, 769, 770, 771, 772, 773, 774, 821, 852, 853, 854, 855, 856, 857, 858, 859, 860, 863, 864, 865, 866, 873, 874, 876, 877, 882, 883, 884, 885, 886, 887, 888, 890, 891, 895, 896, 897, 906, 907, 908, 909, 912, 913, 914, 915, 919, 920, 921, 922, 923, 924, 925, 926, 927, 928, 929, 934, 935, 936, 937, 940, 982, 986, 987, 988, 989, 991, 994, 995, 996, 997, 999	76.9	74.6	72.5	70.5	68.7	58.4	37.6	26.7	20.2	16.0	13.0	10.9	9.2	8.0	7.0	6.2	5.5	5.0
350, 351, 352, 353, 355, 492	63.0	61.2	59.5	57.8	56.3	47.8	31.9	23.3	18.0	14.5	12.0	10.2	8.8	7.7	6.8	6.1	5.5	4.9

Table 5g. Minimum number of trees per acre for forest land based on largest tally tree																		
Species	**DBH of largest tally tree**																	
	Seed-ling	**1.0-1.9**	**2.0-2.9**	**3.0-3.9**	**4.0-4.9**	**5.0-6.9**	**7.0-8.9**	**9.0-10.9**	**11.0-12.9**	**13.0-14.9**	**15.0-16.9**	**17.0-18.9**	**19.0-20.9**	**21.0-22.9**	**23.0-24.9**	**25.0-26.9**	**27.0-28.9**	**29.0+**
314, 315, 318, 330, 331, 332, 333, 334, 336, 337, 370, 371, 372, 377, 450, 451, 452, 531, 552, 712	67.8	65.8	63.9	62.2	60.5	51.4	30.1	19.9	14.2	10.6	8.3	6.7	5.5	4.6	3.9	3.4	2.9	2.6
373, 374, 375, 378, 379	70.2	68.1	66.2	64.4	62.7	53.3	30.9	20.3	14.4	10.7	8.3	6.7	5.5	4.6	3.9	3.3	2.9	2.5
360, 361, 362, 400, 401, 402, 403, 404, 405, 406, 407, 408, 409, 410, 411, 412, 413, 422, 423, 431, 500, 501, 502, 503, 504, 505, 506, 507, 508, 509, 520, 521, 522, 549, 641, 660, 661, 662, 663, 664, 801, 802, 804, 805, 806, 807, 808, 809, 812, 813, 815, 816, 817, 818, 819, 820, 822, 824, 825, 827, 828, 830, 831, 832, 833, 834, 835, 836, 837, 838, 839, 840, 841, 842, 845, 901, 931, 981, 5091, 5092, 5093	63.5	61.6	59.9	58.2	56.7	48.2	30.1	20.9	15.6	12.1	9.7	8.0	6.8	5.8	5.0	4.4	3.9	3.5
600, 601, 602, 603, 604, 605, 606	58.0	56.3	54.7	53.2	51.8	44.0	28.6	20.5	15.6	12.3	10.1	8.5	7.2	6.3	5.5	4.9	4.4	3.9
220, 221, 222, 611, 690, 691, 692, 693, 694	107.7	104.5	101.6	98.8	96.2	81.7	47.7	31.4	22.4	16.8	13.1	10.5	8.6	7.2	6.1	5.3	4.6	4.0
741, 743, 746	67.4	65.4	63.6	61.8	60.2	51.2	33.6	24.3	18.6	14.8	12.2	10.3	8.8	7.7	6.8	6.0	5.4	4.9
540, 541, 542, 543, 545, 546, 547, 548, 621, 650, 651, 652, 654, 655, 657, 658, 720, 721, 722, 762, 993, 7211	79.2	76.9	74.7	72.6	70.7	60.1	43.4	33.7	27.5	23.1	19.8	17.4	15.4	13.8	12.5	11.5	10.5	9.8
950, 951, 952, 953	79.9	77.6	75.4	73.3	71.3	60.6	33.9	21.6	14.9	10.9	8.4	6.6	5.3	4.4	3.7	3.1	2.7	2.3

Table 5g. Minimum number of trees per acre for forest land based on largest tally tree

Species	DBH of largest tally tree																	
	Seed-ling	**1.0-1.9**	**2.0-2.9**	**3.0-3.9**	**4.0-4.9**	**5.0-6.9**	**7.0-8.9**	**9.0-10.9**	**11.0-12.9**	**13.0-14.9**	**15.0-16.9**	**17.0-18.9**	**19.0-20.9**	**21.0-22.9**	**23.0-24.9**	**25.0-26.9**	**27.0-28.9**	**29.0+**
313, 345, 460, 461, 462, 463, 544, 729, 730, 731, 732, 740, 742, 744, 745, 747, 748, 749, 752, 753, 970, 971, 972, 973, 974, 975, 976, 977	68.4	66.4	64.5	62.7	61.0	51.9	30.4	20.1	14.3	10.7	8.4	6.7	5.5	4.6	3.9	3.4	3.0	2.6

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.

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.

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.

Bole – The main stem of a tree, extending from one foot above the ground to the point on the tree where DOB reaches 4 inches

Botched plot – A plot that should not be included in the standard inventory data base due to data collection errors or other problems.

Boundary – The intersection of two or more conditions on a subplot or microplot. Each boundary is described by recording the azimuth and horizontal distance from the subplot or microplot center to the left and right points of where the boundary intersects the perimeter of the subplot or microplot. An azimuth and distance to a corner point may also be described, if one exists. If multiple boundaries exist at a subplot, they are recorded in the order of their occurrence on the subplot, starting from north and proceeding around the compass.

Census Water – Rivers and streams that are more than 200 feet wide and bodies of water that are greater than 4.5 acres in size.

Certification plot – a plot installed by a certification candidate. It may be a training plot or a production plot. The candidate working alone installs the plot.

Cold check – An inspection of a production plot done either as part of the training process, periodic review of field crew performance, or as part of the ongoing QA/QC program. Normally the installation crew is not present at the time of inspection. The inspector has the completed data in-hand at the time of inspection. The inspection can include the whole plot or a subset of the plot. Discrepancies between the inspection crew measurements and the production crew measurements are identified, and changes may be made to production data to correct these errors. Cold checks are done on production plots only.

CONDITION CLASS – The combination of discrete landscape and forest attributes that identify and define different strata on the plot. Examples of such attributes include condition class status, forest type, stand origin, stand size, owner group, reserve status and stand density.

Cropland – Land under cultivation within the past 24 months, including orchards and land in soil improving crops, but excluding land cultivated in developing improved pasture.

CROWN CLASS – A classification of trees based on dominance in relation to adjacent trees within the stand as indicated by crown development and the amount of sunlight received from above and sides.

Cull – Portions of a tree that are unusable for industrial wood products because of rot, form, or other defect.

Diameter at Breast Height (DBH) – The diameter of the bole of a tree at breast height (4.5 feet above the ground), measured outside of the bark.

Diameter at Root Collar (DRC) – The diameter of a tree measured at the ground line or stem root collar, measured outside of the bark.

Diameter Outside Bark (DOB) – A diameter that may be taken at various points on a tree, or log, **outside** of the bark. Diameter Outside Bark is often estimated.

Federal Information Processing Standard (FIPS) – A unique code identifying U.S. States and counties (or units in Alaska).

Forest Industry Land – Land owned by companies or individuals that operate wood-using plants.

Forest Trees – Plants having a well-developed, woody stem and usually more than 12 feet in height at maturity.

FOREST TYPE – A classification of forest land based upon the trees or tree communities that constitute the majority of stocking on the site.

GPS – Global Positioning System. Information from this system is collected and used to determine the latitude and longitude of each plot.

Hardwoods – Dicotyledonous trees, usually broad-leaved and deciduous.

Hot check – an inspection normally done as part of the training process. The inspector is present on the plot with the trainee and provides immediate feedback regarding data quality. Data errors are corrected. Hot checks can be done on training plots or production plots.

Idle Farmland -- Former cropland or pasture that has not been tended within the last 2 years and that has less than 10 percent stocking with live trees.

Improved Pasture -- Land that is currently maintained and used for grazing. Evidence of maintenance, besides the degree of grazing, includes condition of fencing, presence of stock ponds, periodic brush removal, seeding, irrigation, or mowing.

Inclusion – An area that would generally would be recognized as a separate condition, except that it is not large enough to qualify. For example, a ½ acre pond within a forested stand.

Industrial Wood – All roundwood products, except firewood.

Inspection crew – a crew of qualified QC/QA individuals whose primary responsibility is the training, certification and inspection of production crews.

Land Area – As defined by the Bureau of the Census: The area of dry land and land temporarily or partially covered by water such as marshes, swamps, and river flood plains (omitting tidal flats below mean tide); streams, sloughs, estuaries and canals less than 200 feet in width, and ponds less than 4.5 acres in area.

Macroplot – A circular, fixed area plot with a radius of 58.9 feet. Macroplots may be used for sampling relatively rare events.

Maintained Road – Any road, hard topped or other surfaces, that is plowed or graded periodically and capable of use by a large vehicle. Rights-of-way that are cut or treated to limit herbaceous growth are included in this area.

Marsh – Low, wet areas characterized by heavy growth of weeds and grasses and an absence of trees.

Measurement Quality Objective (MQO) – Describes the acceptable tolerance for each data element. MQOs consist of two parts: a statement of the tolerance and a percentage of time when the collected data are required to be within tolerance.

Merchantable Top – The point on the bole of trees above which merchantable material cannot be produced. Merchantable top is 1.5 inches for woodland species and 4.0 inches for all other species.

Microplot – A circular, fixed-radius plot with a radius of 6.8 feet that is used to sample trees less than 5.0 inches at DBH, as well as other vegetation.

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.

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.

RESERVE STATUS – An indication of whether the land in a condition has been reserved.

Saplings – Live trees 1.0 to 4.9 inches DBH.

Seedlings – 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. 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.

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. Variables with both a core and core optional listing are marked with an asterisk.

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
NONFOREST SAMPLING STATUS	No errors	At least 99% of the time	0 to 1	n/a
NONFOREST 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
NONFOREST PLOT NONSAMPLED REASON	No errors	At least 99% of the time	02, 03, 08, 09, 10	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	4.0	n/a
YEAR	No errors	at least 99% of the time	$\geq$ 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 ENTRY METHOD	No errors	At least 99% of the time	0, 1	n/a
GPS DATUM	No errors	at least 99% of the time	NAD83	n/a
COORDINATE SYSTEM	No errors	at least 99% of the time	1, 2	n/a

Variable Name	Tolerance	MQO	Values	Units
LATITUDE DEGREES	When GPS ENTRY METHOD = 0, no errors in data entry When GPS ENTRY METHOD = 1, not applicable	When GPS ENTRY METHOD = 0, at least 99% of the time When GPS ENTRY METHOD = 1, not applicable	0-90	degrees
LATITUDE MINUTES	When GPS ENTRY METHOD = 0, no errors in data entry When GPS ENTRY METHOD = 1, not applicable	When GPS ENTRY METHOD = 0, at least 99% of the time When GPS ENTRY METHOD = 1, not applicable	1 – 59	minutes
LATITUDE SECONDS	When GPS ENTRY METHOD = 0, no errors in data entry When GPS ENTRY METHOD = 1, not applicable	When GPS ENTRY METHOD = 0, at least 99% of the time When GPS ENTRY METHOD = 1, not applicable	0.00 – 59.99	seconds
LONGITUDE DEGREES	When GPS ENTRY METHOD = 0, no errors in data entry When GPS ENTRY METHOD = 1, not applicable	When GPS ENTRY METHOD = 0, at least 99% of the time When GPS ENTRY METHOD = 1, not applicable	1-180	degrees
LONGITUDE MINUTES	When GPS ENTRY METHOD = 0, no errors in data entry When GPS ENTRY METHOD = 1, not applicable	When GPS ENTRY METHOD = 0, at least 99% of the time When GPS ENTRY METHOD = 1, not applicable	1 – 59	minutes
LONGITUDE SECONDS	When GPS ENTRY METHOD = 0, no errors in data entry When GPS ENTRY METHOD = 1, not applicable	When GPS ENTRY METHOD = 0, at least 99% of the time When GPS ENTRY METHOD = 1, not applicable	0.00 – 59.99	seconds

Variable Name	Tolerance	MQO	Values	Units
UTM ZONE	When GPS ENTRY METHOD = 0, no errors in data entry When GPS ENTRY METHOD = 1, not applicable	When GPS ENTRY METHOD = 0, at least 99% of the time When GPS ENTRY METHOD = 1, not applicable	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	When GPS ENTRY METHOD = 0, no errors in data entry When GPS ENTRY METHOD = 1, not applicable	When GPS ENTRY METHOD = 0, at least 99% of the time When GPS ENTRY METHOD = 1, not applicable	0000000-9999999	
NORTHING (Y) UTM	When GPS ENTRY METHOD = 0, no errors in data entry When GPS ENTRY METHOD = 1, not applicable	When GPS ENTRY METHOD = 0, at least 99% of the time When GPS ENTRY METHOD = 1, not applicable	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	No errors	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

Variable Name	Tolerance	MQO	Values	Units
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
NONFOREST CONDITION CLASS STATUS	No errors	at least 99% of the time	2, 5	n/a
NONFOREST CONDITION NONSAMPLED REASON	No errors	at least 99% of the time	02, 03, 10	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 year for 5-year measure. cycles +/ 2 years for > 5-year 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

Variable Name	Tolerance	MQO	Values	Units
DISTURBANCE YEAR 2	+/- 1 year for 5-year measure. cycles +/ 2 years for > 5-year 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 year for 5-year measure. cycles +/ 2 years for > 5-year 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 year for 5-year measure. cycles +/- 2 years for >5-year 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 year for 5-year measure. cycles +/- 2 years for >5-year 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
TREATMENT YEAR 3	+/- 1 year for 5-year measure. cycles +/- 2 years for >5-year 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
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	10-17; 20; 30-34; 40-44	n/a
CANOPY COVER SAMPLE METHOD	None	at least 90% of the time	1-4	n/a

Variable Name	Tolerance	MQO	Values	Units
LIVE CANOPY COVER	No errors for 0-12% live canopy cover; 10% for 13-20% live canopy cover; 25% for 21-100% live canopy cover	at least 99% of the time	00-99 (where 99 = 99-100)	percent
LIVE PLUS MISSING CANOPY COVER	No errors% for 0-12% live plus missing canopy cover; 10% for 13-20% live plus missing canopy cover; 25% for 21-100% live plus missing canopy cover	at least 80% of the time	00-99 (where 99 = 99-100)	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
NONFOREST SUBPLOT/MACROPLOT STATUS	No errors	at least 99% of the time	1 to 3	n/a
NONFOREST SUBPLOT/MACROPLOT NONSAMPLED REASON	No errors	at least 99% of the time	02, 03, 04, 10	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
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	+/- 10 degrees	at least 90% of the time	001 to 360	degrees

Variable Name	Tolerance	MQO	Values	Units
CORNER AZIMUTH	+/- 10 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	+/- 10 degrees	at least 90% of the time	001 to 360	degrees
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
CONDITION CLASS NUMBER	No errors	at least 99% of the time	1 to 9	n/a
AZIMUTH	+/- 10 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

Variable Name	Tolerance	MQO	Values	Units
DIAMETER	+/- 0.1 inch per 20.0 inch increment of measured diameter on all live trees and dead trees with DECAY CLASS = 1, 2 +/-1.0 inch per 20.0 inch increment of measured diameter on dead trees with DECAY CLASS = 3, 4, 5 For woodland species: +/- 0.2 inch per stem	at least 95% of the time	001.0 to 999.9	inches
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*
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

Variable Name	Tolerance	MQO	Values	Units
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
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

Variable Name	Tolerance	MQO	Values	Units
DIAMETER	+/- 0.1 in per 20.0 in increment of measured diameter on all live trees and dead trees with DECAY CLASS = 1, 2 +/- 1.0 in per 20.0 in increment of measured diameter on dead trees with DECAY CLASS = 3, 4, 5 For woodland species: +/- 0.2 in per stem	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*
Phase 2 (P2) Vegetation Profile				
P2 VEGETATION SAMPLING STATUS	*No errors*	*at least 99% of the time*	*0 to 2*	*n/a*
LEVEL OF DETAIL	*No errors*	*at least 99% of the time*	*1 to 3*	*n/a*
SUBPLOT NUMBER	*No errors*	*at least 99% of the time*	*1 to 4*	*n/a*
P2 VEG SUBPLOT SAMPLE STATUS	*No errors*	*at least 99% of the time*	*1, 2*	*n/a*
VEGETATION NONSAMPLED REASON	*No errors*	*at least 99% of the time*	*04, 05, 10*	*n/a*
CONDITION CLASS NUMBER	*No errors*	*at least 99% of the time*	*1 to 9*	*n/a*
VEGETATION SUBPLOT NOTES	*n/a*	*n/a*	*English language ords, phrases, and numbers*	*n/a*

Variable Name	Tolerance	MQO	Values	Units
TALLY TREE SPECIES COVER LAYER 1	*+/- 1 class based on the following canopy cover classes: 1%, 2-5%, 6-10%, 11-25%, 26-50%, 51-75%, 76-95%, 96-100%*	*at least 90% of the time*	*000-100*	*percent*
TALLY TREE SPECIES COVER LAYER 2	*+/- 1 class based on the following canopy cover classes: 1%, 2-5%, 6-10%, 11-25%, 26-50%, 51-75%, 76-95%, 96-100%*	*at least 90% of the time*	*000-100*	*percent*
TALLY TREE SPECIES COVER LAYER 3	*+/- 1 class based on the following canopy cover classes: 1%, 2-5%, 6-10%, 11-25%, 26-50%, 51-75%, 76-95%, 96-100%*	*at least 90% of the time*	*000-100*	*percent*
TALLY TREE SPECIES COVER LAYER 4	*+/- 1 class based on the following canopy cover classes: 1%, 2-5%, 6-10%, 11-25%, 26-50%, 51-75%, 76-95%, 96-100%*	*at least 90% of the time*	*000-100*	*percent*
TALLY TREE SPECIES COVER – AERIAL VIEW	*+/- 1 class based on the following canopy cover classes: 1%, 2-5%, 6-10%, 11-25%, 26-50%, 51-75%, 76-95%, 96-100%*	*at least 90% of the time*	*000-100*	*percent*
NON-TALLY TREE SPECIES COVER LAYER 1	*+/- 1 class based on the following canopy cover classes: 1%, 2-5%, 6-10%, 11-25%, 26-50%, 51-75%, 76-95%, 96-100%*	*at least 90% of the time*	*000-100*	*percent*

Variable Name	Tolerance	MQO	Values	Units
NON-TALLY TREE SPECIES COVER LAYER 2	*+/- 1 class based on the following canopy cover classes: 1%, 2-5%, 6-10%, 11-25%, 26-50%, 51-75%, 76-95%, 96-100%*	*at least 90% of the time*	*000-100*	*percent*
NON-TALLY TREE SPECIES COVER LAYER 3	*+/- 1 class based on the following canopy cover classes: 1%, 2-5%, 6-10%, 11-25%, 26-50%, 51-75%, 76-95%, 96-100%*	*at least 90% of the time*	*000-100*	*percent*
NON-TALLY TREE SPECIES COVER LAYER 4	*+/- 1 class based on the following canopy cover classes: 1%, 2-5%, 6-10%, 11-25%, 26-50%, 51-75%, 76-95%, 96-100%*	*at least 90% of the time*	*000-100*	*percent*
NON-TALLY TREE SPECIES COVER – AERIAL VIEW	*+/- 1 class based on the following canopy cover classes: 1%, 2-5%, 6-10%, 11-25%, 26-50%, 51-75%, 76-95%, 96-100%*	*at least 90% of the time*	*000-100*	*percent*
SHRUB AND WOODY VINE COVER LAYER 1	*+/- 1 class based on the following canopy cover classes: 1%, 2-5%, 6-10%, 11-25%, 26-50%, 51-75%, 76-95%, 96-100%*	*at least 90% of the time*	*000-100*	*percent*
SHRUB AND WOODY VINE COVER LAYER 2	*+/- 1 class based on the following canopy cover classes: 1%, 2-5%, 6-10%, 11-25%, 26-50%, 51-75%, 76-95%, 96-100%*	*at least 90% of the time*	*000-100*	*percent*

Variable Name	Tolerance	MQO	Values	Units
SHRUB AND WOODY VINE COVER LAYER 3	*+/- 1 class based on the following canopy cover classes: 1%, 2-5%, 6-10%, 11-25%, 26-50%, 51-75%, 76-95%, 96-100%*	*at least 90% of the time*	*000-100*	*percent*
SHRUB AND WOODY VINE COVER LAYER 4	*+/- 1 class based on the following canopy cover classes: 1%, 2-5%, 6-10%, 11-25%, 26-50%, 51-75%, 76-95%, 96-100%*	*at least 90% of the time*	*000-100*	*percent*
SHRUB AND WOODY VINE COVER – AERIAL VIEW	*+/- 1 class based on the following canopy cover classes: 1%, 2-5%, 6-10%, 11-25%, 26-50%, 51-75%, 76-95%, 96-100%*	*at least 90% of the time*	*000-100*	*percent*
FORB COVER LAYER 1	*+/- 1 class based on the following canopy cover classes: 1%, 2-5%, 6-10%, 11-25%, 26-50%, 51-75%, 76-95%, 96-100%*	*at least 90% of the time*	*000-100*	*percent*
FORB COVER LAYER 2	*+/- 1 class based on the following canopy cover classes: 1%, 2-5%, 6-10%, 11-25%, 26-50%, 51-75%, 76-95%, 96-100%*	*at least 90% of the time*	*000-100*	*percent*
FORB COVER LAYER 3	*+/- 1 class based on the following canopy cover classes: 1%, 2-5%, 6-10%, 11-25%, 26-50%, 51-75%, 76-95%, 96-100%*	*at least 90% of the time*	*000-100*	*percent*

Variable Name	Tolerance	MQO	Values	Units
FORB COVER LAYER 4	*+/- 1 class based on the following canopy cover classes: 1%, 2-5%, 6-10%, 11-25%, 26-50%, 51-75%, 76-95%, 96-100%*	*at least 90% of the time*	*000-100*	*percent*
FORB COVER LAYER – AERIAL VIEW	*+/- 1 class based on the following canopy cover classes: 1%, 2-5%, 6-10%, 11-25%, 26-50%, 51-75%, 76-95%, 96-100%*	*at least 90% of the time*	*000-100*	*percent*
GRAMINOID COVER LAYER 1	*+/- 1 class based on the following canopy cover classes: 1%, 2-5%, 6-10%, 11-25%, 26-50%, 51-75%, 76-95%, 96-100%*	*at least 90% of the time*	*000-100*	*percent*
GRAMINOID COVER LAYER 2	*+/- 1 class based on the following canopy cover classes: 1%, 2-5%, 6-10%, 11-25%, 26-50%, 51-75%, 76-95%, 96-100%*	*at least 90% of the time*	*000-100*	*percent*
GRAMINOID COVER LAYER 3	*+/- 1 class based on the following canopy cover classes: 1%, 2-5%, 6-10%, 11-25%, 26-50%, 51-75%, 76-95%, 96-100%*	*at least 90% of the time*	*000-100*	*percent*
GRAMINOID COVER LAYER 4	*+/- 1 class based on the following canopy cover classes: 1%, 2-5%, 6-10%, 11-25%, 26-50%, 51-75%, 76-95%, 96-100%*	*at least 90% of the time*	*000-100*	*percent*

Variable Name	Tolerance	MQO	Values	Units
GRAMINOID COVER LAYER – AERIAL VIEW	*+/- 1 class based on the following canopy cover classes: 1%, 2-5%, 6-10%, 11-25%, 26-50%, 51-75%, 76-95%, 96-100%*	*at least 90% of the time*	*000-100*	*percent*
SPECIES GROWTH HABIT	*No errors*	*at least 95% of the time*	*SD, SH, FB, GR, LT*	*n/a*
SPECIES CODE	*No errors*	*at least 80% of the time*	Accepted NRCS species code when the species is known, or an accepted NRCS genus or unknown code when the species is not known	*n/a*
UNIQUE SPECIES NUMBER	*No errors*	*at least 99% of the time*	*1-99, assigned in sequential numbers*	*n/a*
SPECIES CANOPY COVER	*+/- 1 class based on the following canopy cover classes: 1%, 2-5%, 6-10%, 11-25%, 26-50%, 51-75%, 76-95%, 96-100%*	*at least 90% of the time*	*001-100*	*percent*
SPECIES VEGETATION LAYER	*No errors*	*at least 90% of the time*	*1 to 4*	*n/a*
SPECIMEN OFFICIALLY COLLECTED	*No errors*	*at least 99% of the time*	*0, 1*	*n/a*
SPECIMEN LABEL NUMBER	*No errors*	*at least 99% of the time*	*1 to 99999, as pre-printed and assigned by region*	*n/a*
P2 SPECIMEN NOT COLLECTED REASON CODE	*No errors*	*at least 99% of the time*	*01-07, 10*	*n/a*
VEGETATION SPECIES NOTES	*n/a*	*n/a*	*English language words, phrases, and numbers*	*n/a*
Invasive Plants				
INVASIVE PLANT SAMPLING STATUS	No errors	at least 99% of the time	0 to 2	n/a
SUBPLOT NUMBER	No errors	at least 99% of the time	1 to 4	n/a
INVASIVE PLANT SUBPLOT STATUS	No errors	at least 99% of the time	1 to 3	n/a
INVASIVE PLANT NONSAMPLED REASON	No errors	at least 99% of the time	4, 5, 10	n/a

Variable Name	Tolerance	MQO	Values	Units
INVASIVE PLANT DATA NOTES	n/a	n/a	English language words, phrases, and numbers	n/a
CONDITION CLASS NUMBER	No errors	at least 99% of the time	1-9	n/a
SPECIES CODE	No errors	at least 99% of the time	Accepted NRCS species code from the appropriate list for the unit when the species is known, or a NRCS unknown code when the species is not known.	n/a
UNIQUE SPECIES NUMBER	No errors	at least 99% of the time	1-99, assigned in sequential numbers	n/a
SPECIES CANOPY COVER	*+/- 1 class based on the following canopy cover classes: 1%, 2-5%, 6-10%, 11-25%, 26-50%, 51-75%, 76-95%, 96-100%*	*at least 90% of the time*	*000-100*	*percent*
INVASIVE PLANT SPECIMENCOLLECTION RULE	No errors	at least 99% of the time	0, 1	n/a
INVASIVE SPECIMEN COLLECTED	No errors	at least 99% of the time	0, 1	n/a
SPECIMEN LABEL NUMBER	No errors	at least 99% of the time	1 to 99999, as pre-printed and assigned by FIA unit	n/a
INVASIVE PLANT NOTES	n/a	n/a	English language words, phrases, and numbers	n/a

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	1	3			80

Previous Measurement	Present Measurement	PREVIOUS TREE STATUS	PRESENT TREE STATUS	RECONCILE	Standing Dead	CAUSE OF DEATH
	as forest					
Dead 5.0+ DBH/DRC	Dead standing 5.0 DBH/DRC	2	2		1	
Dead 5.0+ DBH/DRC	Dead down 5.0+	2	2		0	
Dead 5.0+ DBH/DRC	Dead DBH/DRC < 5.0	2	2		0	
Dead 5.0+ DBH/DRC	Cruiser is unable to locate tree due to a weather (including geologic) or fire event & assume it is down dead	2	2		0	
Dead 5.0+ DBH/DRC	Tree removed (cut and hauled away)	2	3			
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		

Previous Measurement	Present Measurement	PREVIOUS TREE STATUS	PRESENT TREE STATUS	RECONCILE	Standing Dead	CAUSE OF DEATH
< 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		

Appendix 9. Invasive Plant List

			Forest Service Regions and States in which the invasive plant species data are collected							
PLANTS Code	Scientific name	Common name	NRS[a]	PNW AK[b]	PNW R5[c]	RM States[d]	SR All[e]	SR Added for FL[f]	SR group[g]	Note
ABPR3	*Abrus precatorius*	rosarypea						Y		
ABTH	*Abutilon theophrasti*	velvetleaf				CO				
ACPL	*Acer platanoides*	Norway maple	Y							
ACBR5	*Achnatherum brachychaetum*	shortbristled needlegrass				AZ				
ACRE3	*Acroptilon repens*	hardheads				AZ,CO,ID, MT,NV,NM, UT,WY				
AECY	*Aegilops cylindrica*	jointed goatgrass				AZ,CO,ID, NM				
AIAL	*Ailanthus altissima*	tree of heaven (341)[h]	Y				Y	Y		
ALJU	*Albizia julibrissin*	silktree (345)[h]	Y				Y	Y		
ALMA12	*Alhagi maurorum*	camelthorn				AZ,CO,NV, NM				
ALPE4	*Alliaria petiolata*	garlic mustard	Y	Y			Y	Y		
ALPH	*Alternanthera philoxeroides*	alligatorweed				AZ				
AMTO3	*Ambrosia tomentosa*	skeletonleaf burr ragweed				ID,WY				
ANCR2	*Anoda cristata*	crested anoda				CO				
ANAR6	*Anthemis arvensis*	corn chamomile				CO				
ANCO2	*Anthemis cotula*	stinking chamomile				CO,NV				
ARMI2	*Arctium minus*	lesser burrdock				CO,WY				
ARCR80	*Ardisia crenata*	hen's eyes						Y		
ARAB3	*Artemisia absinthium*	absinthium				CO				
ARDO4	*Arundo donax*	giant reed					Y	Y		
ASFI2	*Asphodelus fistulosus*	onionweed				NM				
BAMBU	*Bambusa*	Non-native bamboos					Y	Y	1	

			Forest Service Regions and States in which the invasive plant species data are collected							
PLANTS Code	Scientific name	Common name	NRS[a]	PNW AK[b]	PNW R5[c]	RM States[d]	SR All[e]	SR Added for FL[f]	SR group[g]	Note
BETH	*Berberis thunbergii*	Japanese barberry	Y							
BEVU	*Berberis vulgaris*	Common barberry	Y							
BRIN2	*Bromus inermis*	smooth brome		Y						
BRTE	*Bromus tectorum*	cheatgrass		Y		CO				
CABU2	*Capsella bursa-pastoris*	shepherd's purse		Y						
CAAR18	*Caragana arborescens*	Siberian peashrub		Y						
CACH10	*Cardaria chalapensis*	lenspod whitetop				AZ				
CADR	*Cardaria draba*	whitetop				AZ,CO,ID, MT,NV,NM, UT,WY				
CAPU6	*Cardaria pubescens*	hairy whitetop				AZ,WY				
CAAC	*Carduus acanthoides*	spiny plumeless thistle				AZ,CO,WY				
CANU4	*Carduus nutans*	nodding plumeless thistle			Y	CO,ID,NV, NM,UT,WY				
CACA19	*Carum carvi*	caraway				CO				
CAEQ	*Casuarina equisetifolia*	beach sheoak						Y		
CEOR7	*Celastrus orbiculatus*	oriental bittersweet	Y				Y	Y		
CEEC	*Cenchrus echinatus*	southern sandbur				AZ				
CESP4	*Cenchrus spinifex*	coastal sandbur				AZ				
CEBI2	*Centaurea biebersteinii*	spotted knapweed	Y	Y	Y	AZ,CO,ID, MT,NV,NM, UT,WY				
CECA2	*Centaurea calcitrapa*	red star-thistle				AZ,NV,NM				
CEDE5	*Centaurea debeauxii*	meadow knapweed				CO,ID				
CEDI3	*Centaurea diffusa*	white knapweed			Y	AZ,CO,ID, MT,NV,NM,				

			Forest Service Regions and States in which the invasive plant species data are collected							
PLANTS Code	Scientific name	Common name	NRS[a]	PNW AK[b]	PNW R5[c]	RM States[d]	SR All[e]	SR Added for FL[f]	SR group[g]	Note
						UT,WY				
CEIB	*Centaurea iberica*	Iberian knapweed				AZ,NV				
CEME2	*Centaurea melitensis*	Maltese star-thistle				NV,NM				
CESO3	*Centaurea solstitialis*	yellow star-thistle			Y	AZ,CO,ID, MT,NV,NM, UT				
CESU	*Centaurea sulphurea*	sulphur knapweed				AZ,CO				
CETR8	*Centaurea triumfettii*	squarrose knapweed				AZ,CO,NV, UT				
CHJU	*Chondrilla juncea*	hogbite			Y	AZ,CO,ID, MT,NV				
CIIN	*Cichorium intybus*	chicory				CO				
CIMA2	*Cicuta maculata*	spotted water hemlock				NV				
CICA	*Cinnamomum camphora*	camphortree						Y		
CIAR4	*Cirsium arvense*	Canada thistle	Y	Y	Y	AZ,CO,ID,M T,NV,NM, UT,WY				
CIVU	*Cirsium vulgare*	bull thistle	Y	Y		CO,NM				
CLOR	*Clematis orientalis*	oriental virginsbower				CO				
COMA2	*Conium maculatum*	poison hemlock				CO,ID,NV, NM				
COAR4	*Convolvulus arvensis*	field bindweed				AZ,CO,ID, MT,NM,UT, WY				
COSQ	*Coronopus squamatus*	greater swinecress				AZ				
CRTE3	*Crepis tectorum*	narrowleaf hawksbeard		Y						

			Forest Service Regions and States in which the invasive plant species data are collected							
PLANTS Code	Scientific name	Common name	NRS[a]	PNW AK[b]	PNW R5[c]	RM States[d]	SR All[e]	SR Added for FL[f]	SR group[g]	Note
CRVU2	*Crupina vulgaris*	common crupina				CO,ID,NV				
CUME	*Cucumis melo*	cantaloupe				AZ				
CUAN4	*Cupaniopsis anacardioides*	carrotwood						Y		
CUSCU	*Cuscuta*	Dodder				AZ				
CYLO11	*Cynanchum louiseae*	Louis' swallow-wort	Y							
CYRO8	*Cynanchum rossicum*	European swallow-wort	Y							
CYDA	*Cynodon dactylon*	Bermudagrass				UT				
CYOF	*Cynoglossum officinale*	gypsyflower				CO,MT,NV, WY				
CYES	*Cyperus esculentus*	chufa flatsedge				CO				
CYSC4	*Cytisus scoparius*	scotchbroom		Y		ID				
DAGL	*Dactylis glomerata*	orchardgrass		Y						
DIBU	*Dioscorea bulbifera*	air yam					Y	Y	4	
DIOP	*Dioscorea oppositifolia*	Chinese yam					Y	Y	4	
DIFU2	*Dipsacus fullonum*	Fuller's teasel				CO,NM				
DILA4	*Dipsacus laciniatus*	Cutleaf teasel				CO				
DRAR7	*Drymaria arenarioides*	sandwort drymary				AZ,NM				
EIAZ2	*Eichhornia azurea*	anchored water hyacinth				AZ				
EICR	*Eichhornia crassipes*	common water hyacinth				AZ				
ELAN	*Elaeagnus angustifolia*	Russian olive	Y			CO,NM	Y	Y		
ELPU2	*Elaeagnus pungens*	thorny olive					Y	Y		
ELUM	*Elaeagnus umbellata*	autumn olive	Y				Y	Y		
ELRE4	*Elymus repens*	quackgrass		Y		AZ,CO,UT, WY				
ERCI6	*Erodium cicutarium*	redstem stork's bill				CO				
EUUN2	*Eugenia uniflora*	Surinam cherry						Y		

			Forest Service Regions and States in which the invasive plant species data are collected							
PLANTS Code	Scientific name	Common name	NRS[a]	PNW AK[b]	PNW R5[c]	RM States[d]	SR All[e]	SR Added for FL[f]	SR group[g]	Note
EUAL8	*Euonymus alata*	winged burning bush					Y	Y		
EUFO5	*Euonymus fortunei*	winter creeper					Y	Y		
EUCY2	*Euphorbia cyparissias*	cypress spurge				CO				
EUDE4	*Euphorbia dentata*	toothed spurge				ID				
EUES	*Euphorbia esula*	leafy spurge	Y		Y	AZ,CO,ID, MT,NV,NM, UT,WY				
EUMY2	*Euphorbia myrsinites*	myrtle spurge				CO				
EUOB4	*Euphorbia oblongata*	eggleaf spurge			Y					
EUMU	*Euryops multifidus*	hawk's eye				AZ				
FRAL4	*Frangula alnus*	glossy buckthorn	Y							
GAOF	*Galega officinalis*	professor-weed				NV				
GALEO	*Galeopsis*	hempnettle		Y						
GEMO2	*Genista monspessulana*	French broom			Y					
HAGL	*Halogeton glomeratus*	saltlover				AZ,CO,NM				
HEHE	*Hedera helix*	English ivy	Y				Y	Y		
HECI	*Helianthus ciliaris*	Texas blueweed				AZ				
HEMA3	*Hesperis matronalis*	dames rocket	Y			CO				
HITR	*Hibiscus trionum*	flower of an hour				CO				
HIAU	*Hieracium aurantiacum*	orange hawkweed		Y		CO,ID,MT				
HICA10	*Hieracium caespitosum*	meadow hawkweed		Y		ID,MT				
HIPI	*Hieracium pilosella*	mouseear hawkweed		Y						
HIPI2	*Hieracium piloselloides*	tall hawkweed				MT				
HIUM	*Hieracium umbellatum*	narrowleaf hawkweed		Y						
HIFL3	*Hieracium x floribundum*					MT				

			Forest Service Regions and States in which the invasive plant species data are collected							
PLANTS Code	Scientific name	Common name	NRS[a]	PNW AK[b]	PNW R5[c]	RM States[d]	SR All[e]	SR Added for FL[f]	SR group[g]	Note
HOJU	*Hordeum jubatum*	foxtail barley		Y						
HYVE3	*Hydrilla verticillata*	waterthyme				AZ,CO,NV, NM				
HYNI	*Hyoscyamus niger*	black henbane				CO,ID,NV, NM				
HYPE	*Hypericum perforatum*	common St. Johnswort			Y	CO,MT,NV, WY				
HYRA3	*Hypochaeris radicata*	hairy catsear		Y						
IMGL	*Impatiens glandulifera*	ornamental jewelweed		Y						
IMCY	*Imperata cylindrica*	cogongrass					Y	Y		
INHI	*Indigofera hirsuta*	roughhairy indigo						Y		
IPOMO	*Ipomoea*	morning-glory				AZ				
IPTR2	*Ipomoea triloba*	littlebell				AZ				
IRPS	*Iris pseudacorus*	paleyellow iris				MT				
ISTI	*Isatis tinctoria*	Dyer's woad				CO,ID,MT, NV,NM,UT, WY				
KOSC	*Kochia scoparia*	Mexican-fireweed								
LACA2	*Lantana camara*	lantana						Y		
LASQ	*Lappula squarrosa*	European stickseed		Y						
LELA2	*Lepidium latifolium*	broadleaved pepperweed				CO,ID,MT, NV,NM,UT, WY				
LEBI2	*Lespedeza bicolor*	shrubby lespedeza					Y	Y		
LECU	*Lespedeza cuneata*	Chinese lespedeza				CO	Y	Y		
LEVU	*Leucanthemum vulgare*	oxeye daisy		Y		CO,MT,WY				
LIJA	*Ligustrum japonicum*	Japanese privet					Y	Y	7	
LILU2	*Ligustrum lucidum*	glossy privet					Y	Y	7	

			Forest Service Regions and States in which the invasive plant species data are collected							
PLANTS Code	Scientific name	Common name	NRS[a]	PNW AK[b]	PNW R5[c]	RM States[d]	SR All[e]	SR Added for FL[f]	SR group[g]	Note
LISI	*Ligustrum sinense*	Chinese privet					Y	Y	9	
LIVU	*Ligustrum vulgare*	common privet	Y				Y	Y	9	
LIDA	*Linaria dalmatica*	Dalmatian toadflax				AZ,CO,ID, MT,NV,NM, WY				
LIGE	*Linaria genistifolia*	broomleaf toadflax				CO				
LIVU2	*Linaria vulgaris*	butter and eggs		Y		CO,ID,MT, NV,NM,WY				
LOLIU	*Lolium*	ryegrass		Y						
LOAR10	*Lolium arundinaceum*	tall fescue					Y	Y		
LONIC	*Lonicera*	Non-native bush honeysuckles					Y	Y		Consists of L. maackii, L. morrowii, L. tatarica, L. fragrantissima , or L. x bella
LOJA	*Lonicera japonica*	Japanese honeysuckle	Y				Y	Y		
LOMA6	*Lonicera maackii*	Amur honeysuckle	Y							
LOMO2	*Lonicera morrowii*	Morrow's honeysuckle	Y							
LOTA	*Lonicera tatarica*	Tatarian honeysuckle	Y							
LOBE	*Lonicera x bella*	Showy fly honeysuckle	Y							
LYJA	*Lygodium japonicum*	Japanese climbing fern					Y	Y		
LYMI	*Lygodium microphyllum*	small-leaf climbing fern						Y		
LYNU	*Lysimachia nummularia*	creeping jenny	Y							

			Forest Service Regions and States in which the invasive plant species data are collected							
PLANTS Code	Scientific name	Common name	NRS[a]	PNW AK[b]	PNW R5[c]	RM States[d]	SR All[e]	SR Added for FL[f]	SR group[g]	Note
LYSA2	*Lythrum salicaria*	purple loosestrife	Y			AZ,CO,ID, MT,NV,NM, UT,WY				
LYVI3	*Lythrum virgatum*	European wand loosestrife				MT,NV				
MAUN3	*Macfadyena unguis-cati*	catclawvine						Y		
MADI6	*Matricaria discoidea*	disc mayweed		Y						
MEDIC	*Medicago*	alfalfa		Y						
MEPO3	*Medicago polymorpha*	burclover				AZ				
MEQU	*Melaleuca quinquenervia*	punktree (992) [h]	Y					Y		
MEAZ	*Melia azedarach*	Chinaberrytree (993) [h]	Y				Y	Y		
MEAL12	*Melilotus alba*	white sweetclover		Y						
MEOF	*Melilotus officinalis*	yellow sweetclover		Y						
MIVI	*Microstegium vimineum*	Nepalese browntop	Y				Y	Y		
MIVE3	*Milium vernale*	spring milletgrass				ID				
MISI	*Miscanthus sinensis*	Chinese silvergrass					Y	Y		
MYSP2	*Myriophyllum spicatum*	spike watermilfoil				CO,ID,MT, NV,NM				
NADO	*Nandina domestica*	sacred bamboo					Y	Y		
NAST3	*Nardus stricta*	matgrass				ID				NAST3
NATR3	*Nassella trichotoma*	serrated tussock grass				AZ				NATR3
NECO3	*Nephrolepis cordifolia*	narrow swordfern						Y		NECO3
ONAC	*Onopordum acanthium*	Scotch cottonthistle				AZ,CO,ID, NV,NM,UT, WY				ONAC

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PLANTS Code	Scientific name	Common name	NRS[a]	PNW AK[b]	PNW R5[c]	RM States[d]	SR All[e]	SR Added for FL[f]	SR group[g]	Note
ONTA	*Onopordum tauricum*	bull cottonthistle				CO				ONTA
ORRA	*Orobanche ramosa*	hemp broomrape				AZ				ORRA
PAFO3	*Paederia foetida*	stinkvine						Y		PAFO3
PAMI2	*Panicum miliaceum*	broomcorn millet				CO				PAMI2
PARE3	*Panicum repens*	torpedo grass				AZ				PARE3
PATO2	*Paulownia tomentosa*	princesstree (712)[h]	Y				Y	Y		PATO2
PEHA	*Peganum harmala*	harmal peganum				AZ,CO,NV, NM				
PECI	*Pennisetum ciliare*	Buffelgrass				AZ				
PEPU2	*Pennisetum purpureum*	elephant grass						Y		
PHAR3	*Phalaris arundinacea*	reed canarygrass	Y	Y						
PHPR3	*Phleum pratense*	timothy		Y						
PHAU7	*Phragmites australis*	common reed	Y							
PHYLL6	*Phyllostachys*	Non-native bamboos					Y	Y	1	
PLMA2	*Plantago major*	common plantain		Y						
POAV	*Polygonum aviculare*	prostrate knotweed		Y						
POCU6	*Polygonum cuspidatum*	Japanese knotweed	Y	Y						
POSA4	*Polygonum sachalinense*	giant knotweed	Y							
POBO10	*Polygonum x. bohemicum*	Japanese/giant knotweed hybrid	Y							Species not in PLANTS 2000
POOL	*Portulaca oleracea*	little hogweed				AZ				
PORE5	*Potentilla recta*	sulphur cinquefoil				CO,MT,NV				
PRPA5	*Prunus padus*	European bird cherry		Y						
PSGU	*Psidium guajava*	guava						Y		
PUMOL	*Pueraria montana var. lobata*	kudzu					Y	Y		

			Forest Service Regions and States in which the invasive plant species data are collected							
PLANTS Code	Scientific name	Common name	NRS[a]	PNW AK[b]	PNW R5[c]	RM States[d]	SR All[e]	SR Added for FL[f]	SR group[g]	Note
PYCA80	*Pyrus calleryana*	Callery pear					Y	Y		
RAAC3	*Ranunculus acris*	tall buttercup				MT				
RARE3	*Ranunculus repens*	creeping buttercup		Y						
RHCA3	*Rhamnus cathartica*	common buckthorn	Y							RHCA3
RHTO	*Rhodomyrtus tomentosus*	rose myrtle						Y		RHTO
ROPS	*Robinia pseudoacacia*	black locust	Y							ROPS
ROAU	*Rorippa austriaca*	Austrian yellowcress				AZ,NV				ROAU
ROSA5	*Rosa*	non-native rose					Y	Y		ROSA5
ROMU	*Rosa multiflora*	multiflora rose	Y							ROMU
SAAE	*Salvia aethiopis*	Mediterranean sage				CO,NV				SAAE
SAMO5	*Salvinia molesta*	kariba-weed				AZ,CO,NV				SAMO5
SAOF4	*Saponaria officinalis*	bouncingbet				CO				SAOF4
SCAC2	*Schefflera actinophylla*	octopus tree						Y		SCAC2
SCTE	*Schinus terebinthifolius*	Brazilian peppertree						Y		
SEJA	*Senecio jacobaea*	stinking willie		Y		AZ,CO,ID, MT				
SEVU	*Senecio vulgaris*	old-man-in-the-Spring		Y						
SOCA3	*Solanum carolinense*	Carolina horsenettle				AZ,NV				
SOEL	*Solanum elaeagnifolium*	silverleaf nightshade				ID,NV				
SORO	*Solanum rostratum*	buffalobur nightshade				ID				
SOTA3	*Solanum tampicense*	scrambling nightshade						Y		

			Forest Service Regions and States in which the invasive plant species data are collected							
PLANTS Code	Scientific name	Common name	NRS[a]	PNW AK[b]	PNW R5[c]	RM States[d]	SR All[e]	SR Added for FL[f]	SR group[g]	Note
SOVI2	*Solanum viarum*	tropical soda apple				AZ	Y	Y		
SOAR2	*Sonchus arvensis*	field sowthistle		Y		AZ,CO,ID, NV,WY				
SOAL	*Sorghum almum*	Columbus grass				NV,UT				
SOBI2	*Sorghum bicolor*	sorghum				NV				
SOHA	*Sorghum halepense*	Johnsongrass				CO,ID,NV, UT				
SOPR3	*Sorghum propinquum*	sorghum				NV				
SPSA3	*Sphaerophysa salsula*	alkali swainsonpea				NV				
SPJA	*Spiraea japonica*	Japanese meadowsweet	Y							
STME2	*Stellaria media*	common chickweed		Y						
STRIG	*Striga*	witchweed				AZ				
SYCU	*Syzygium cumini*	Java plum						Y		
TACA8	*Taeniatherum caput-medusae*	medusahead			Y	CO,NV,UT				
TAMAR2	*Tamarix*	tamarisk				MT,NM,WY				
TACH2	*Tamarix chinensis*	Fivestamen tamarisk				CO				TACH2
TAPA4	*Tamarix parviflora*	smallflower tamarisk				CO,NV				TAPA4
TARA	*Tamarix ramosissima*	saltcedar	Y			CO,NV				TARA
TAVU	*Tanacetum vulgare*	common tansy		Y		CO,MT				TAVU
TAOF	*Taraxacum officinale*	common dandelion		Y						TAOF
TRDU	*Tragopogon dubius*	yellow salsify		Y						TRDU
TRNA	*Trapa natans*	water chestnut				AZ				TRNA
TRSE6	*Triadica sebifera*	tallowtree (994)[h]	Y				Y	Y		TRSE6
TRTE	*Tribulus terrestris*	puncturevine				AZ,CO,ID,				TRTE

			Forest Service Regions and States in which the invasive plant species data are collected							
PLANTS Code	Scientific name	Common name	NRS[a]	PNW AK[b]	PNW R5[c]	RM States[d]	SR All[e]	SR Added for FL[f]	SR group[g]	Note
						NV				
TRIFO	*Trifolium*	clover		Y						TRIFO
TRPE21	*Tripleurospermum perforata*	scentless false mayweed				CO				TRPE21
ULPU	*Ulmus pumila*	Siberian elm (974)[h]	Y			NM				ULPU
VEBL	*Verbascum blattaria*	moth mullein				CO				VEBL
VETH	*Verbascum thapsus*	common mullein				CO				VETH
VIOP	*Viburnum opulus*	European cranberrybush	Y							VIOP
VICRC	*Vicia cracca ssp. cracca*	bird vetch		Y						VICRC
VIMA	*Vinca major*	bigleaf periwinkle					Y	Y	12	VIMA
VIMI2	*Vinca minor*	common periwinkle					Y	Y	12	VIMI2
WIFL	*Wisteria floribunda*	Japanese wisteria					Y	Y	13	WIFL
WISI	*Wisteria sinensis*	Chinese wisteria					Y	Y	13	WISI
ZYFA	*Zygophyllum fabago*	Syrian beancaper				ID				ZYFA
Total number of species:			43	44	11	128	40	60		All: 237

[a] Northern Research Station (formerly Northeast Research Station and North Central Research Station)
[b] Pacific Northwest Research Station - Alaska
[c] Pacific Northwest Research Station – Region 5 only list
[d] Rocky Mountain Research Station States
[e] Southern Research Station - species recorded in all SRS areas
[f] Southern Research Station – additional species recorded in Florida only
[g] Southern Research Station – species with the same number in this column indicate that the SRS crews are not asked to distinguish among those species. So a code may refer to any species in the group.
[h] Number corresponds to appendix 3 , the FIA Species Code List

Appendix 10. Unknown Plant Specimen Collection

The following information describes some useful procedures and examples of data-collection aids for collecting plant specimens. The preferred option is to use procedures developed for the P3 Vegetation Indicator protocol which relies on automated data-recorder and database tracking of plant specimens. This protocol also automates the creation of labels for specimens that can be downloaded and printed.

If your unit requires collection of plant specimens for species that:

1) may be on the invasive species list for your area that you cannot identify quickly and confidently using field guides but are potentially identifiable, or

2) are on the invasive species list for your area but are a new record for the state,

follow these basic steps:

1. Assign a valid SPECIES CODE.
2. Record if a specimen was collected or not in INVASIVE SPECIMEN COLLECTED.
3. When a specimen is collected, enter a SPECIMEN LABEL NUMBER. Place the pre-printed label with the corresponding label number in the bag with the specimen.
4. Describe any newly encountered unknown species in INVASIVE PLANTS NOTES.
5. Record the canopy cover estimates of the unknown species on the condition on the subplot where encountered.

Example Field Specimen Label
Where specimen collection is part of the protocol, each crew will be issued a set of printed, pre-numbered labels to track unknown specimens. The information to be completed by hand in the field is optional, but may include date, unknown code, unique species number and crew name.

Label Number:**1**
Date: *8/06/06*
Unknown Code:*ACANT2* Unique Species Nbr:*1*
Veg Spec. crew: *John Doe*

Example Specimen Label
Official specimen labels are printed from plot data collected in the data-recorder (PDR) and accompany the unknown specimen as it is pressed, dried and submitted for further identification. Labels will not include sensitive plot identification data – the unique specimen label number is sufficient identification for each specimen.

Specimen Label			
State:	Ohio	**County:**	Lawrence
Plot:			
Label Number:	21	**Resolved Species Code:**	
Resolved scientific name:			
Resolved by (name):			
Date Collected:	6/22/2005		
Unknown Code:	2GRAM	**Unique Species Nbr:**	7
Field collected scientific name:			
Collected by:	(name or number)		
Community type(s) where found:			bottomland, old stripmine
	ridgetop with atv trl, stripped yrs ago		moist bottom

Collecting and pressing plants
If fewer than 5 individuals of an unknown herbaceous plant species are present **do not collect**.

Use a digging tool to extract the entire plant, including any underground portions, flowers, fruits, and leaves. If the plant is abundant, collection of two samples will increase the likelihood of a good specimen.

Collected unknown specimens should be transported in the field and from the field in the 1 and/or 2 gallon zip-lock bags provided. Only one species and label may be placed in a single bag. Acceptable methods of transporting collected specimens include:

- Use a 3-hole-punch to punch holes in the bottom of your bags prior to traveling in the field. Place the punched bags into a 2-inch 3-ring binder with the zip-lock portion facing outward. Plants can then be placed with labels into the bag directly in the binder. This method prevents crumpling, tearing, and destroying the specimen during transportation.
- Use a 1-hole-punch to punch a hole in the one upper corner of each bag. The hole should be placed in such a manner that it cannot easily be torn. Place the bags on an aluminum carabineer (available at drug stores) or on heavy twine and fasten to your field vest or backpack. Be careful to seal the plants and labels securely inside the bags to prevent accidental loss.

Press and label the plant if not identified by the end of the day:

A. After returning to the field office print all of the labels associated with the collected unknown specimens. The printed labels should now have all of the plot information (plot number, state, notes, unknown code, etc.) in addition to the original label number, make sure that the printed information is correct and matches the unknown specimen before including it in the press.

B. Each specimen representing a unique species should be placed individually inside a single layer of folded newsprint. Each specimen is to be accompanied by its corresponding unknown specimen label. Small plant specimens are to be pressed individually. Large plant specimens may be folded in a “v”, “z”, or “w” arrangement to fit on a single newsprint page. Arrange the specimen so that at least one upper and one lower leaf surface is exposed. Plants may be trimmed to reduce bulk, so long as all diagnostic parts are included. Diagnostic portions include stem sections, petioles, leaves, roots, flowers, and fruits. Bulky fruits or nuts may be stored separately in a paper envelope that is taped to the newsprint and is accompanied by an identical copy of the specimen's unknown label. Unknown codes can be written on the outside of the folded newspaper to aid sorting as specimens are processed.

C. Stack the specimens in their individual newsprint sleeves between two pieces of cardboard. Bind the cardboard and plants together using a piece of twine or flat cloth ribbon wrapped around the length and width of the cardboard bundle. For mailing numerous specimens, several bundles may be used. Place all bundles inside a cardboard box for shipping.

Package and submit specimens as dictated by your FIA unit or lab. It is suggested that Unknown specimens be packaged and shipped at the end of every work week. Exceptions will be made when extended field excursions prevent the vegetation specialist from reaching a post office.

All packaged specimens are to be accompanied by a legible completed label. Unknown Spreadsheets tracking collected unknown plants are generated from the PDR plot file.