FOREST INVENTORY AND ANALYSIS
NATIONAL CORE FIELD GUIDE

VOLUME I: FIELD DATA COLLECTION PROCEDURES FOR PHASE 2 PLOTS

Version 5.0

NORTHERN RESEARCH STATION

FOREST SERVICE

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"Anyone who establishes a permanent plot should recognize that he or she hereby assumes responsibility for furnishing workers with a complete picture of conditions on the plot at the time of its establishment. Not only must each plot be properly marked and all measures are in near perfect order, but all notes and records must be complete. Otherwise, the plots may fail to yield the desired results and those who in later years become responsible for their care and for the analysis of the data, may be led to serious mistakes."

[U.S. Department of Agriculture, Forest Service 1935.]

NRS Note to User: Data elements and procedures from the previous regional guides may no longer be applicable. Version 5.0 is based on the *National Core Field Guide, Version 5.0*. All data elements are national unless indicated as follows:

- National data elements that end in "+N" (e.g., x.x+N) have added values/codes*. Any additional regional text for a national data element is hi-lighted or shown as a "NRS Note."
- All regional data elements end in "N" (e.g., x.xN). The text for a regional data element is not hi-lighted.
- All state specific regional data elements end in "N-XX" (e.g., x.xN-ME). The text for state data element is not hi-lighted.
- National data elements or procedures with light gray text are not applicable in the North.

* It should be noted that all national data elements with added regional values/codes must be collapsed back to existing national standards by the Information Group unless supported by *NIMS*.

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FOREST INVENTORY AND ANALYSIS
NATIONAL CORE FIELD GUIDE

VOLUME I: FIELD DATA COLLECTION PROCEDURES FOR PHASE 2 PLOTS

Version 5.0

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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
\+ National Appendices 1 – 9
\+ Regional Appendices A – J

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.

NRS Note: Some regional data items are described in the field guide but do not require any data entry. These variables are "hidden" variables that are required for regional programming and/or logic checks on collected data items. Data items that require a field entry have an associated PDR prompt. Some of these items may be auto-filled (i.e., downloaded values).

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).

NRS Note: Some CORE variable tolerances have been tightened to comply with regional requirements.

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

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

Units Of Measure

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

Plot Dimensions:

Macroplot:

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

Subplot:

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

Microplot:

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

Annular plot:

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.

NRS Note: Macroplots are not installed in the North and all reference to a macroplot in Section 1.0 to 9.0 has been shaded out or removed for this regional guide.

Each subplot contains a microplot of approximately 1/300 acre in size with a radius of 6.8 feet. The center of the microplot is offset 90 degrees and 12.0 feet horizontal (+/- 1 foot) from each subplot center. Microplots are numbered in the same way as subplots. Microplots are used to select and collect data on saplings (DBH/DRC of 1.0 inch through 4.9 inches) and seedlings (DBH/DRC less than 1.0 inch in diameter and greater than or equal to 0.5 foot in length [conifers] or greater than or equal to 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.

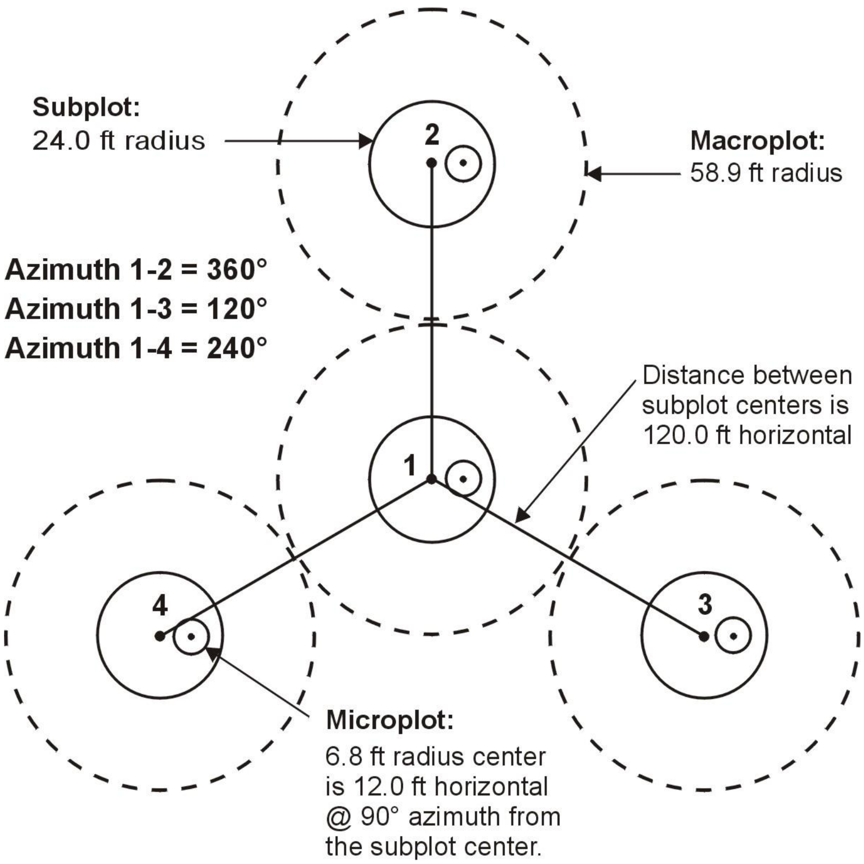
The annular plot may be used for destructive sampling such as collecting soil samples. Also the term annular plot will be used for instructions in the field guide, for example, instructions on numbering trees when the macroplots are installed.

NRS Note: Annular plots are not installed in the North and all reference to an annular plot in Section 1.0 to 9.0 has been shaded out or removed for this regional guide.

Data are collected on field plots at the following levels:

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

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



0.1 Plot Setup

Plots will be established according to the regional guidelines of each FIA unit. (See Regional Appendix A for plot establishment and/or relocation procedures.) 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 *degrees*	Backsight *degrees*	Distance *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 PRESENT TREE STATUS = 0 and RECONCILE = 7 to all downloaded trees (i.e., incorrectly tallied at the previous survey).
- Assign PRESENT TREE STATUS = 1 or 2 and 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 for all new trees.

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. Not applicable in the North.
- 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).

- Boring trees for age on subplots to determine tree age, site index, stand age, or for other reasons.

- 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.

NRS Note: The use of alternative tools is not applicable.

- Toppling of dead trees or saplings.

0.3N PLOT DATA SECURITY

All collected data are considered SENSITIVE MATERIAL and are private! NRS-FIA must safeguard all the data to best of our ability. Do not give out any information about specific plots or landowners unless authorization has been given from St. Paul or Newtown Square. Landowners are allowed access to plot data collected on their property. Plot information can be given to the owner of the property, but guidelines need to be followed.

You CAN

- show the landowner the plot packet, including the image
- allow the landowner to accompany you to the plot location
- offer to have a copy of the image mailed to the landowner, **if they initiate the request**
- provide a summary of the information collected to the landowner

You SHOULD NOT

- give the landowner any materials with coordinates, plot numbers, or the X marking the location
- offer to provide extra information unless asked
- suggest management practices in any summary information you provide

EXPLANATION

When attempting to gain permission on a plot, feel free to show the landowner the image that is in the plot packet. This will help them get an idea as to where the plot is located and help to confirm that the plot is located on their property.

If the landowner requests any of the current plot packet, including the image, do not provide them with it. Legally, we cannot provide the coordinates, plot number, or the exact location on the image to a landowner. Instead, offer to have a copy of the image mailed to them and indicate it will take a few days. This image will not contain an 'X' that marks the plot center. If the landowner needs the general location indicated, a circle (~5 acres in size) can be added **at the crew's request**.

If the landowner requests to accompany you onto the plot, this is fine to allow them to do so. It is essential that you brief them that they **SHOULD NOT** manage the area any differently than the rest of their property. We are tracking how the resources are being utilized and any special treatment to the area will result in mis-information being reported.

If a landowner requests a follow-up report on what we encountered on plot, we are allowed to provide this as well. Make sure the landowner is aware that the data we collect is on a limited area and likely will not represent their land as a whole. Do your best to summarize the information that was collected on plot with a write-up. **DO NOT** give them any management suggestions for the property.

If a landowner requests other documents or publications, do your best to fulfill this request at the field level. The response time for them to receive information will be much quicker when completed by a field crew member. If the request needs to be filled by St. Paul, it will likely be quite some time before they receive a packet. The exception to this will be if a copy of the image is requested. This request will be fulfilled in a timely manner.

Please do not make a habit of offering any of the above services. Leave it up to the landowner to make the request before an offer of information is given. It is our job to provide information to the customers, but the resources and time to provide these items is limited.

Requests for plot locations from GPS coordinates, photo images and maps and PLOT NUMBER are to be directed through St. Paul or Newtown Square. It is a federal offence to intentionally release this data. If the landowner specifically requests the GPS coordinates, forward the request to Newtown Square.

NRS-FIA has partnerships with other public agencies and other organizations. Many times, we are allowed to share information with these different partners. Prior to releasing any plot information verify with St. Paul or Newtown Square that the requestor has entered into a Memorandum of Understanding (MOU) with the Forest Service. This MOU serves to outline the conditions under which the Forest Service will release plot locations to partners who are actively engaged in implementing or forwarding the Forest Service mission through work or research, and the protections imposed to insure continued privacy and confidentiality of the personal information released.

It is everyone's responsibility to keep the data safe and secure in order to ensure access to plots in the future. NRS-FIA must maintain a working relationship with our partners and ensuring the security of plot data is one way to achieve that goal.

0.4N WILDERNESS AREAS

Servicewide Agreement O9-SA-FIA01 is in effect as of September 21, 2009 for WILDERNESS AND WILD AND SCENIC RIVERS (WWSR). This Servicewide Agreement (SA) provides special provisions for conducting FIA inventories in Wilderness areas on the National Forest System. The special provisions from this document have been noted in this field guide where it concerns plot establishment, diameter measurements, stand age and site index. Other provisions from the SA are as follows:

- At least one week prior to commencement of field operations, FIA will furnish the designated WWSR Wilderness Manager with the following information:
  a. Names of key personnel involved and their titles.
  b. Number of personnel per party.
  c. Dates and locations of field work within Wilderness boundaries.
  d. Cellular telephone numbers used by all inventory crews in lieu of radio frequencies and call names and numbers.

- This agreement does not authorize any entry upon, or activities within, any lands not under the jurisdiction of the WWSR Wilderness Manager, including private in holdings within National Forest boundaries. Such activities must be coordinated and authorized prior to entry, through the respective agency or owner.

- <u>Field personnel must carry an approved research permit at all times when engaged in data collection activities in Wilderness</u>. This permit shall only apply to the timeframe and content of the approved project plan of work.

Measuring and recording methods in Wilderness areas must be sensitive to the generally undisturbed character of these areas and leave as few signs of disturbance as possible. It is important to be able to relocate plots, subplots, and trees measured during the inventory. In Wilderness areas, less visible markings are always appropriate. Detailed, concise sketches and notes will make subsequent relocation easier.

- Identifying tags/nails - Marking tags/nails should be used minimally, painted an approved color, and face away from obvious trails and roads. Tags and nails may only be used at the base of the reference tree. All other tally trees are marked with a nail only at the base. Thin barked trees should not have nails placed in them as there is potential for disease or death.

- Flagging - Any flagging used to facilitate entry and exit from the plot area will be removed upon completion of the plot measurements.

- Painting/Scribing - This practice will not be used to monument the plot, identify witness trees, or to mark breast height.

Specimen Collection

- No personal flora or fauna collection is permitted on Wilderness lands. Collections are for scientific or educational purposes only, dedicated to public benefit, and may not be used for personal or commercial profit. All collections for scientific purposes must be approved by the WWSR Wilderness Manager.

- No archeological or vertebrate paleontological materials may be collected. Upon location of any historical or archeological remains field work will cease and the site shall be reported immediately to the local WWSR Wilderness Manager. No disturbance of such a site is permitted.

Site Condition

- All refuse associated with field operations shall be removed from Wilderness lands and the site of any data collection or encampment shall be returned to the condition in which it was found, except as authorized by the project work plan.

- Soil disturbance is prohibited, except as specifically authorized in the mutually agreed upon project work plan.

- Temporary markers, such as flagging, may not remain in place for more than one week when study teams are not present on a site. Paint, or similar semi-permanent markers, may not be applied to rocks, plants, or other natural surfaces.

Wildlife Interaction

- Harassment, hazing, or other disturbance of wildlife is prohibited.

- Problem encounters with wildlife, including any experienced or observed incidents of wildlife obtaining food or garbage from humans, shall be reported promptly to the WWSR Wilderness Manager. All food and garbage will be stored in a sealed containers approved by the local WWSR Wilderness Manager. Field personnel will make all reasonable efforts to prevent wildlife from obtaining food or garbage from humans.

National Parks have similar requirements. Permits are required for any research work completed within the park. FIA has a national agreement to use tags and nails. Do not paint or scribe in a National Park.

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.

1.0.1N CYCLE **[CYCL]**

This variable represents the number of times a state has been inventoried (includes periodic and annual). In the annual inventory, a cycle is the completion of all sub-cycles.

When collected: All plots
Field width: 2 digits
Tolerance: N/A
MQO: N/A
Values: Downloaded value and preprinted on plot location sheet (See also- Appendix J)

1.0.2N SUB-CYCLE **[SUBC]**

This variable identifies the sub-panels that are being inventoried. In the annual forest inventory, a sub-cycle is the completion of 14 sub-panels (five year cycle length) or 10 sub-panels (seven year cycle length) in a year.

When collected: All plots
Field width: 1 digit
Tolerance: N/A
MQO: N/A
Values: Downloaded value and preprinted on plot location sheet (See also- Appendix J)

1.1 STATE **[ST]**

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(Downloaded value and preprinted on plot location sheet)

1.1.1N UNIT **[UNIT]**

Record the unique code identifying the inventory unit where the plot center is located.

When collected: All plots
Field width: 1 digit
Tolerance: No errors
MQO: At least 99% of the time
Values: See Appendix 1 (Downloaded value and preprinted on plot location sheet)

1.2 COUNTY **[CNTY]**

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

When collected: All plots
Field width: 3 digits
Tolerance: No errors
MQO: At least 99% of the time
Values: See Appendix 1 (Downloaded value and preprinted on plot location sheet)

1.3 PLOT NUMBER **[PLT#]**

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).

NRS Note: Contact the St. Paul office to obtain a replacement PLOT NUMBER when SAMPLE KIND = 3. Two electronic data files will be required in this case. One with the original number defined as a Lost Plot and one with the new number defined as a Replacement Plot.

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 (Downloaded value and preprinted on plot location sheet)

1.4 PLOT STATUS **[STAT]**

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 (Downloaded "hidden" value)
1 Nonforest plots / conditions are inventoried

NRS Note: Nonforest inventories are not conducted in our region, i.e. NONFOREST SAMPLING STATUS = 1.

1.6 NONFOREST PLOT STATUS **[NFPS]**

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 **[REAS]**

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. A plot note is required specifying who (may or may not be the plot's landowner if crossing multiple properties) and why, if an explanation is given.

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.

NRS Note: Nonforest inventories are not conducted in our region, i.e. NONFOREST SAMPLING STATUS = 1.

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 **[EXAM]**

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

NRS Note: Each state has up to 25 nonforest QA/QC PI and potentially a QA/QC SPECIAL plot that require a field visit to confirm if the P1 photo interpretation was properly determined in the office. These plots cannot be coded as 1. These plots require on-site field verification. (See Regional Appendix A for additional information.)

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 – Utilized during Photo Interpretation in office from photos, maps, etc.
4 All four subplots fully described (no assumptions/inferences) – on site field verification. Subplot center does not need to be occupied.

1.10 SAMPLE KIND **[SK]**

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

NRS Note: When a plot is being located over a previous established plot, the plot center of subplot 1 will be established over the previous established plot center. (See Regional Appendix C for special instructions.)

When collected: All plots
Field width: 1 digit
Tolerance: No errors
MQO: At least 99% of the time
Values: (Downloaded value and preprinted on plot location sheet)

1 Initial plot establishment (P2 or P3) - 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 (PLOT STATUS = 3 and PLOT NONSAMPLED REASON = 02 or 03 from the previous annual inventory cycle).

2 Remeasurement (P2 or P3) – remeasurement of a national design plot that was sampled at the previous annual inventory cycle.

3 Replacement plot (P2 or P3) - 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. Contact the St. Paul office for a new plot number.

1.10.1N PHASE

This variable indicates the type of plot that is being completed. Phase 2 represents all plots from the base grid. Phase 3 plots area a subset of Phase 2. Phase 3 plots were previously identified and known as FHM plots.

When collected: All plots
Field width: 1 digit
Tolerance: N/A
MQO: N/A
Values: 2 or 3 (downloaded “hidden” value and preprinted on plot location sheet only)

1.11 PREVIOUS PLOT NUMBER **[PRV#]**

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.

NRS Note: This variable is auto coded as a downloaded “hidden” variable within the *MIDAS PDR Application*.

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 and PREVIOUS DATE

Record the year, month, and day that the current plot visit was completed as described in 1.13.1 – 1.13.5N. Previous plot year and month for all remeasurement plots are downloaded/hidden variables used for logic checks in Condition and Tree data.

1.13.1 YEAR **[YEAR]**

Record the year that the plot was completed.

When collected: All plots
Field width: 4 digits
Tolerance: No errors
MQO: At least 99% of the time
Values: ≥ 2010

1.13.2 MONTH **[MONT]**

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 **[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

1.13.4N PREVIOUS YEAR

The year that the plot was previously completed is used as a logic check for recorded condition and tree data.

When collected: All plots
Field width: 4 digits
Tolerance: N/A
MQO: N/A
Values: Downloaded “hidden” value and preprinted on plot location sheet

1.13.5N PREVIOUS MONTH

The month that the plot was previously completed is used as a logic check for recorded condition and tree data.

When collected: All plots
Field width: 2 digits
Tolerance: N/A
MQO: N/A
Values: Downloaded "hidden" value and preprinted on plot location sheet

1.14 DECLINATION (CORE OPTIONAL)

NRS Note: This variable is not collected in our region.

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 **[RDIS]**

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.

NRS Note: A private drive or access road within accessible forest land is considered a road if it meets the qualifications stated above. A private drive or access road adjacent to or within nonforest (CONDITION STATUS = 2) is not considered an improved road.

NRS Note: Improved roads should not have advanced rutting, old washouts, old fallen trees, vegetation, etc. that inhibits regular vehicular travel.

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 – 1.5 chains or less
2 101 to 300 ft – 1.5 chains to 4.55 chains
3 301 to 500 ft – 4.55 chains to 7.58 chains
4 501 to 1000 ft – 7.58 chains to 15.2 chains
5 1001 ft to 1/2 mile – 15.2 chains to 40 chains
6 1/2 to 1 mile – 40 chains to 80 chains
7 1 to 3 miles – 80 chains to 240 chains
8 3 to 5 miles – 240 chains to 400 chains
9 Greater than 5 miles – Greater then 400 chains

1.16 WATER ON PLOT **[WTYP]**

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 (too small to qualify as noncensus water). This variable can be used for recreation, wildlife, hydrology, and timber availability studies.

NRS Note: Do not tally this variable for water that is already defined as a separate Noncensus or Census Water Condition. This variable is intended to indicate the presence of water that has not already defined as its own separate condition.

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 forested swamps, bogs or marshes classified as accessible forest land with standing trees
3 Ditch/canal – human-made channels used as a means of moving water, such as irrigation or drainage which are too small to qualify as noncensus water
4 Temporary streams
5 Flood zones – evidence of flooding when bodies of water exceed their natural banks
9 Other temporary water – specify in plot notes (includes Springs)

1.17 QA STATUS **[QAST]**

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

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

1 Standard production plot
2 Cold check
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 **[CRW1, CRW2, CRW3, CRW4, CRW5]**

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

1.18.1N ONE OR TWO PERSON PLOT **[CRSZ]**

Enter a code which indicates that the plot could be completed with either a one person crew or with a two person crew. As a guideline, consider what can be completed **safely** by an average crewmember or crew.

When collected: All plots where Plot Status (STAT) = 1 or 2
Field width: 1 digit
Tolerance: N/A
MQO: N/A
Values:

1 Could be completed by a one person crew
2 Should be completed by a two person crew

1.18.2N PLOT SEASON **[SEAS]**

Enter the code reflecting the best time of year to access and complete this plot. If there are no hindrances (e.g., water, vegetation, remoteness) for completing this plot at any time of year, enter code 3. Do not base your assessment on whether or not the plot is chosen for P3, PA Regeneration or Invasive tally.

When collected: All plots where Plot Status (STAT) = 1 or 2
Field width: 1 digit
Tolerance: N/A
MQO: N/A
Values:

1 Winter
2 Summer
3 Anytime

1.18.3N TRAINING PLOT **[TRAN]**

Indicate whether the plot is completed by a crew with a new Federal crew member. Plots coded as 1 "training plot" will typically take more time to complete due to explaining, defining, and demonstrating how to collect FIA plot data. Supervisory approval is required in order to code 1 "training plot" outside the normal window allowed for training a new Federal crew member.

When collected: All plots
Field width: 1 digit
Tolerance: N/A
MQO: N/A
Values:

- 0 Standard production plot
- 1 Training plot

1.18.4N QA SCORE **[QASC]**

Record the QA score to the nearest tenth of a percent when PLOT STATUS is 1 (Sampled – at least one accessible forest land condition present on plot) or 2 (Sampled – no accessible forest land condition present on plot) and QA STATUS is 2 (cold check) or 6 (blind Check). QAQC PI and QAQC Special plots will not require QA SCORE for any Plot Status. (See Regional Appendix C for additional information about PI and Special plot designation.)

When collected: Plots with PLOT STATUS = 1 or 2 and QA STATUS = 2 or 6. Do not collect for QAQC PI and QAQC Special.
Field width: 4 digits
Tolerance: No errors
MQO: At least 99% of the time
Values: 000.0 to 100.0

1.18.5N DENIED ACCESS REASON **[DARE]**

Record the method by which a plot was Denied Access. Choose from the following codes. If more than one method applies, choose the last method you used in the attempt to obtain permission.

When collected: When PLOT STATUS = 3 (Nonsampled with possibility of forest land present) and PLOT NONSAMPLED REASON = 2 (Denied access).
Field width: 1 digit
Tolerance: No errors
MQO: At least 99% of the time
Values:

- 1 In person
- 2 On phone
- 3 Letter with NO phone number available
- 4 Letter WITH phone number available
- 5 Unable to contact – NO phone number and didn't respond to letter
- 6 Unable to contact – WITH phone number and didn't respond to letter
- 7 Insufficient public information – NO phone number, letters returned as undeliverable

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.

NRS Note: Every attempt should be made to collect GPS data on plots that plot center is occupied, but in some cases it is not possible. If for some reason GPS coordinates are not collected, we **do not** want either the previous coordinates or the PI coordinates from the plotsheet entered into the data recorder. Much of the GPS screen should be left blank.

The procedures to enter data into the data recorder when GPS coordinates are not taken are as follows:

- Enter '**GPS Unit**' as '**0**' (GPS coordinates not collected)
- Delete the downloaded valuefor '**GPS Datum**' (DATM)
- Delete the downloaded value for '**Coordinate System**' (CSYS)
- Leave all other data item blank

For the standard field plots, if coordinates were not collected, a PLOT NOTE must be entered in the *MIDAS PDR Application* and on the plotsheet. If it is a QAQC-PI plot, a note is not necessary.

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).

NRS Note: Most NRS-FIA Allegros are loaded with LANDMARK CE software and are accompanied with an EMTAC/RIGHTWAY GPS receiver. When using a combination of the two, the LANDMARK CE software will allow a coordinates file to be created on the Allegro that can auto-populate the MIDAS Starting Point or Plot Center GPS screens. Once the LANDMARK CE software has completed it averaging process, navigate to either the MIDAS Starting Point or Plot Center GPS screen and Click on Ctrl+K. This will auto-populate the point data into their respective fields.

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

If it is still not possible to get suitable coordinates from plot center, attempt to obtain them from a location within 200 feet of plot center. Obtain the azimuth and horizontal distance from the "offset" location to plot center. If *LANDMARK CE* software is used, use the offset function to compute the coordinates of the plot center. If another type of GPS unit is used, record the azimuth and horizontal distance as described in Sections 1.19.14 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. Again, if *LANDMARK CE* software is used, use the offset function to compute the coordinates of the plot center. If another type of GPS unit is used, record the azimuth and horizontal distance as described in Sections 1.19.14 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 **[UNIT]**

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

NRS Note: If GPS coordinates cannot be collected for any reason, enter code 0 for GPS UNIT. The remaining GPS variables for PC are not recorded. The regional SP coordinates will not be required either but should be transferred from previous plotsheet if present and valid. (See Regional Appendix A for required PDR SP variables.)

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 including *LANDMARK CE*
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 **[GPS#]**

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

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

1.19.5 GPS ENTRY METHOD **[METH]**

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.

NRS Note: GPS ENTRY METHOD is auto-populated in the *PDR MIDAS Application* as read-only. If the data is transferred electronically it will populate a '1' in this field. If any auto-populated GPS data is keypunched, even after being transferred, a '0' will be populated for GPS ENTRY METHOD.

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 **[DATM]**

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).

NRS Note: All GPS coordinates will be collected using NAD83. NAD27 that was applied in the former Northeast for 2.0 or earlier versions of the field guide is no longer used. All NAD27 coordinates written on 2.0 or earlier tally sheets have been converted to NAD83. These converted coordinates are preprinted on the current plot location sheet.

NAD83 will be displayed on GPS screen as a Download Value.

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 **[CSYS]**

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

NRS Note: The geographic coordinate system value 1 will be displayed on GPS screen as a Download Value.

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

NRS Note: The former procedure of collecting latitude and longitude as degrees and decimal minutes is no longer applicable. Coordinates will now by collected as degrees, minutes and seconds for latitude and longitude at both SP and PC.

Example: 41° 38.1306 degrees and decimal minutes is converted to degrees minutes and decimal seconds as:

41°
.1306 X 60 = 7.836 or 07.84"

41° 38' 07.84"

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

NRS Note: Latitude is also collected for all new starting points (SP) where a course to plot is being established for the first time or a starting point is changed from the previous cycle. A starting point should be changed if the old location is no longer adequate for plot relocation. E.g., due to a new road, there is now a better access point to the plot. A new SP is installed along the new road that reduces the chaining distance to the plot. This SP data are recorded on the plot location sheet and the data recorder. See Regional Appendix A for required PDR SP variables.

On a remeasurement annual plot (SK 2), latitude at PC is remeasured even if the previous value is satisfactory for plot relocation.

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 **[NDEG]**
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 **[NMIN]**
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 **[NSEC]**

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.

NRS Note: Longitude is also collected for all new starting points where a course to plot is being established for the first time or a starting point is changed from the previous cycle. This data is recorded on the plot location sheet and the data recorder. See Regional Appendix A for required PDR SP variables.

On a remeasurement annual plot (SK 2), longitude at PC is remeasured even if the previous value is satisfactory for plot relocation.

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 **[WDEG]**

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 **[WMIN]**

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 **[WSEC]**

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

NRS Note: This variable is not collected in our region.

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

NRS Note: This variable is not collected in our region.

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

NRS Note: This variable is not collected in our region.

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

NRS Note: The following variables pertaining to the correction for "offset" are used only if the recorded latitude and longitude coordinates **do not** relate to the plot center and require post correction at the regional office. In the North, most GPS units have program software utilities to calculate plot center coordinates if azimuth and distance are known to plot center.

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 (including *LANDMARK CE* software) 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 **[AZM]**

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 **[DIST]**

Record the horizontal distance in feet from the location where coordinates were collected to the actual plot center. If coordinates are collected at plot center 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 **[ELEV]**

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

NRS Note: If GPS coordinates are collected at different location other then PC, no data will be entered into GPS ELEVATION.

When collected: When GPS UNIT = 1, 2 or 4
Field width: 6 digits (1st digit is + or -, last 5 digits are numeric)
Tolerance:
MQO: At least 99% of the time
Values: -00100 to +20000

State	Highest Point	Elevation	Lowest Point	Elevation
Connecticut	Mt. Frissel – S slope	2,380	Long Island Sound	Sea level
Delaware	Ebright Azimuth	448	Atlantic Ocean	Sea level
D.C.	Tenleytown at Reno Reservoir	410	Potomac River	1
Illinois	Charles Mound	1,235	Mississippi River	279
Indiana	Hoosier Hill Point	1,257	Ohio River	320
Iowa	Hawkeye Point	1,670	Mississippi River	480
Kansas	Sunflower	4,039	Verdigris River	679
Maine	Mt. Katahdin	5,267	Atlantic Ocean	Sea level
Maryland	Backbone Mt.	3,360	Atlantic Ocean	Sea level
Massachusetts	Mt. Greylock	3,487	Atlantic Ocean	Sea level
Michigan	Mt. Arvon	1,979	Lake Erie	572
Minnesota	Eagle Mt.	2,301	Lake Superior	600
Missouri	Taum Sauk Mt.	1,772	St. Francis River	230
Nebraska	Panorama Point	5,424	Missouri River	840
New Hampshire	Mt. Washington	6,288	Atlantic Ocean	Sea level
New Jersey	High Point	1,803	Atlantic Ocean	Sea level
New York	Mt. Marcy	5,344	Atlantic Ocean	Sea level
North Dakota	White Butte	3,506	Red River	750
Ohio	Campbell Hill	1,549	Ohio River	455
Pennsylvania	Mt. Davis	3,213	Delaware River	Sea level
Rhode Island	Jerimoth Hill	812	Atlantic Ocean	Sea level
South Dakota	Harney Peak	7,242	Big Stone Lake	966
Vermont	Mt. Mansfield	4,393	Lake Champlain	95
West Virginia	Spruce Knob	4,861	Potomac River	240
Wisconsin	Timms Hill	1,951	Lake Michigan	579

1.19.17 GPS ERROR **[ERRS]**

Record the EHE error as shown on the GPS unit to the nearest foot. As described in Section 1.19.2, 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

1.19.17.1N GPS PDOP **[PDOP]**

Record the Position Dilution of Precision (PDOP) value as shown on the *LANDMARK CE* software to the nearest tenth. When averaging, the software requires a minimum amount of precision to determine whether or not to ignore a positional measurement. The recorded PDOP measures the overall accuracy of measurements.

Note: If the GPS UNIT does not display this value, enter 0.0.

When collected: When GPS UNIT = 2
Field width: 2 digits (x.y)
Tolerance: No errors
MQO: At least 99% of the time
Values: 0.0, 0.1 to 8.0

1.19.18 NUMBER OF READINGS **[READ]**

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

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

1.19.19 GPS FILENAME (CORE OPTIONAL)

NRS Note: This variable is not collected in our region.

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)

NRS Note: This variable is not collected in our region.

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. Others may find this information helpful when checking or processing the plot data, or even when re-establishing the plot during the next inventory cycle. **The value of good notes cannot be overemphasized.**

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 a 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.

NRS Note: If PLOT STATUS = 1, then delineation is required between CONDITION CLASS STATUSES 1, 2, 3, 4 and/or 5. If PLOT STATUS = 2 or 3, then no further delineation is required. The first nonforest/nonsampled land use delineated on a subplot in numeric order is recorded for the entire plot. Additional nonforest /nonsampled land uses are not delineated. Use the pre-printed plot diagram to illustrate the other nonforest land uses not recorded. The plot diagram is useful for plot relocation during the next cycle.

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 2.5.24).

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.

NRS Note: For pasture or range where there is mowing (i.e., brush hogging to control regeneration of trees and shrubs; not for recreation or yard maintenance) or intensive grazing; stocking must be at least 10% by trees > 1.0 inch DBH. If this factor is met for stocking, the plot is given CONDITION CLASS STATUS = 1 and the plot is installed. See Figure 41.1N in Appendix 5+N.

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.

NRS Note: The preceding text under section (b) is not applicable in the states of KS, NE, ND and SD where Rocky Mountain Juniper (Juniperis scopulorum) may be encountered. This is the only woodland species recognized within NRS and is generally found in the western half of these states. This species is represented in Appendix 5 stocking tables and the standard procedures for determining stocking are applied.

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).

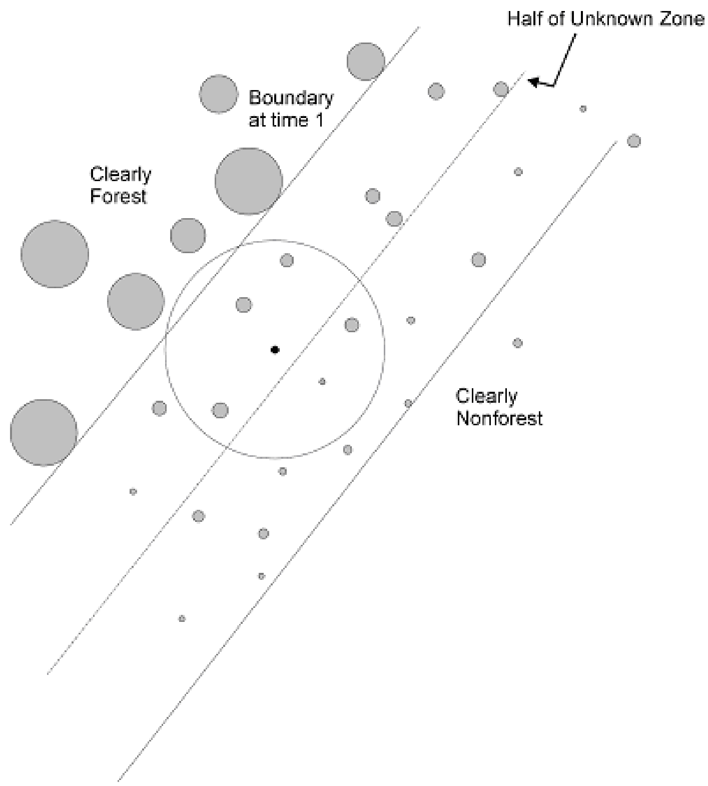


Figure 2. Example of classifying the condition class of the subplot in a transition zone with forest/nonforest encroachment.

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.

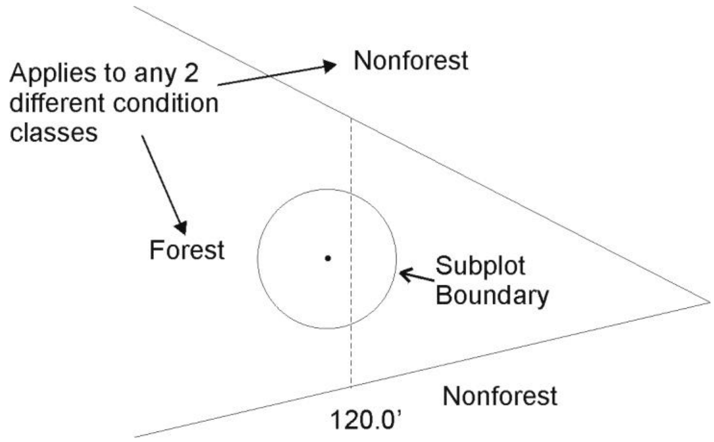


Figure 3. Forest condition narrows within a nonforest land condition. Examine the location of the subplot center in reference to the approximate line where the forest narrows to 120.0 ft wide. In this example, the entire subplot is classified as forest.

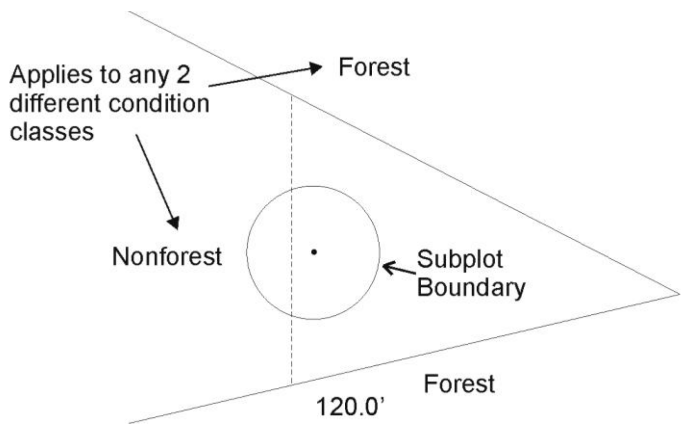


Figure 4. Nonforest land condition narrows within a forest condition. Examine the location of the subplot center in reference to the approximate line where the nonforest narrows to 120.0 ft wide. In this example, the entire subplot is classified as forest.

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.

NRS Note: Commercial cranberry bogs and concrete ponds/raceways associated with fish hatcheries and sewage treatment facilities are considered CONDITION CLASS STATUS = 2. They should NOT be coded STATUS 3 or 4. Earthen fish hatcheries or sewage treatment ponds maybe be considered under STATUS 3 or 4 if they meet minimum size requirements.

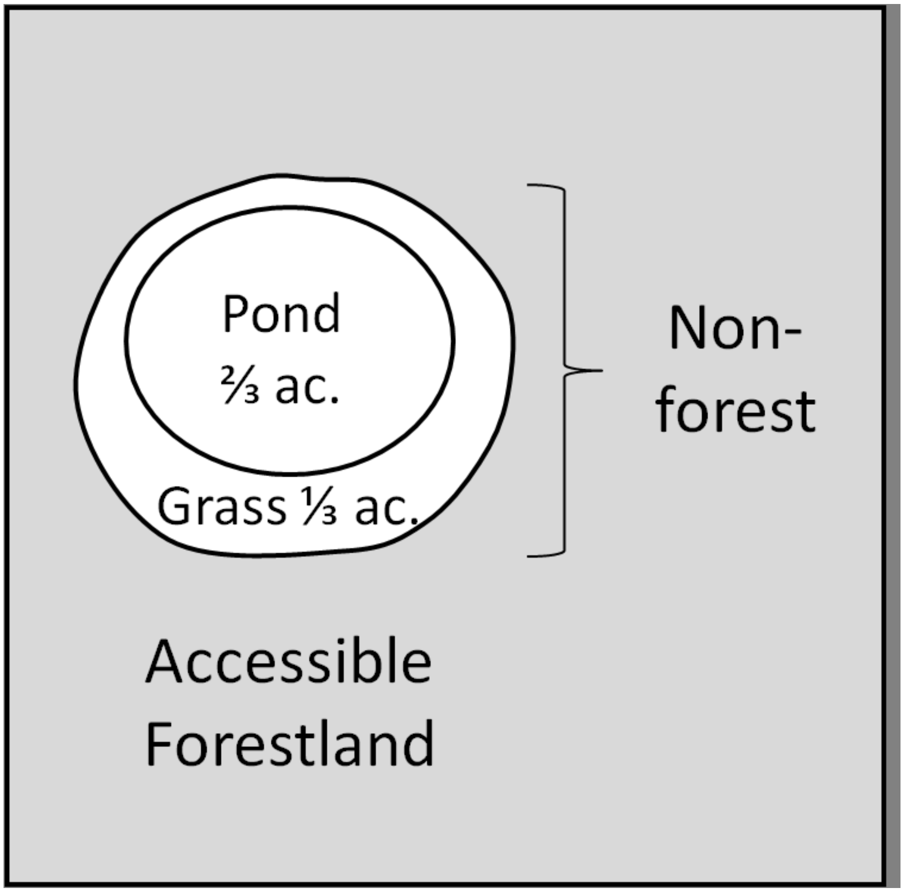


Figure 4.1N. Neither the pond nor the grass can independently qualify as a Status 1, 3, or 4 but combined together they are an acre in size. Since Nonforest Land is defined as any land (at least 120' and an acre in size) within the sample that does not meet the definitions of Accessible Forest Land, Noncensus Water, or Census water, the white area is defined as Status 2 (Nonforest Land).

If the combined area of the pond and grass were < 1 acre in size, the white area would be considered an inclusion within the forestland and be classified as Status 1 (Accessible Forest Land).

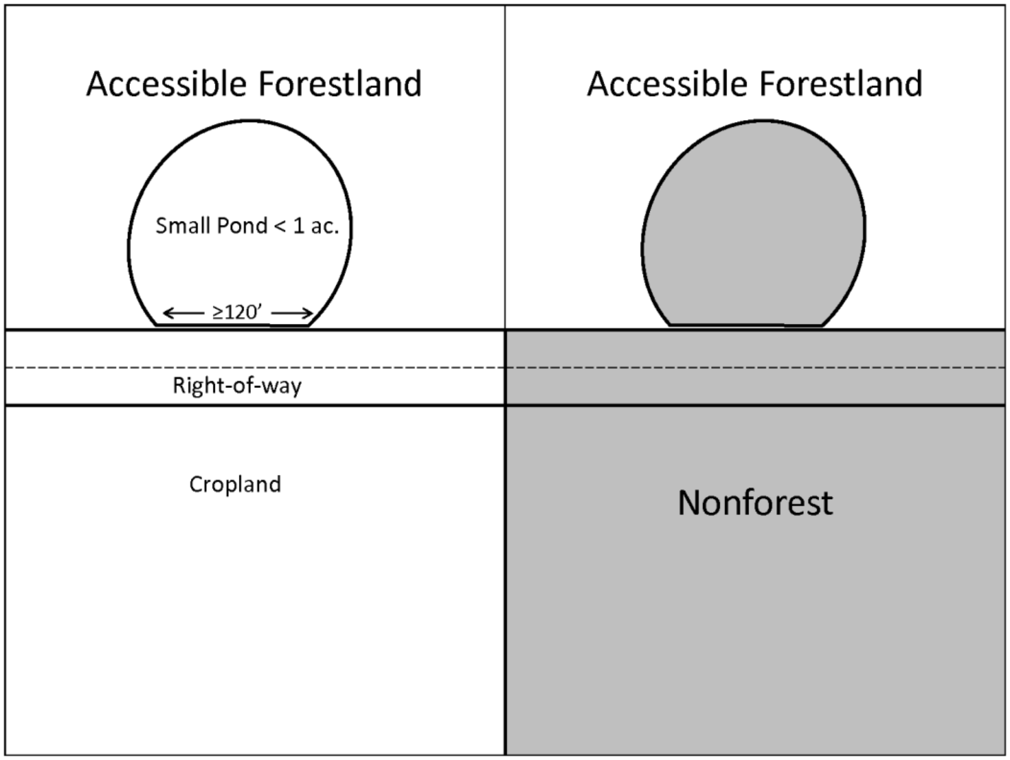


Figure 4.2N. The above figure displays the delineation of the plot area on the left and the assigned Condition Class of the same plot area on the right. The small pond does not qualify as a Status 1, 3, or 4 but shares a 120' boundary with the road and cropland. This shared 120' boundary allows the area of the pond to be combined with the road and cropland. In which case, the pond, the road, and the cropland are classified as Status 2 (Nonforest Land).

If the small pond did not share this 120' shared boundary with the road and cropland the small pond would be considered an inclusion within forestland and be classified as Status 1 (Accessible 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.

   NRS Note: Non-linear Noncensus water must maintain a minimum width of 120 ft.

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).

   NRS Note: The minimum required dimensions for Condition Class Status 3 and 4 are measured to the mean high water mark and these minimum dimensions must be maintained over the entirety of the condition. When an area below the mean high water mark allows the establishment and survival of trees, as demonstrated by the presence of forestland consisting of trees greater than 1" DBH, all measurements shall be taken to the forestland boundary instead of the mean high water mark. Areas of trees that are less than 1" in size will not be considered forestland if they fall below the mean highwater mark.

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	
2.5.2	OWNER GROUP	
2.5.3	FOREST TYPE	Attributes where a change causes a separate condition class
2.5.4	STAND SIZE CLASS	
2.5.5	REGENERATION STATUS	
2.5.6	TREE DENSITY	
2.5.7	OWNER CLASS	
2.5.8	PRIVATE OWNER INDUSTRIAL STATUS	
2.5.9	ARTIFICIAL REGENERATION SPECIES	
2.5.10	STAND AGE	Ancillary - changes do not delineate a new condition class
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	
2.5.23.1N	PRODUCTIVITY STATUS	
2.5.24+N	PRESENT NONFOREST LAND USE (for area converted from accessible forest land condition class to nonforest land since last inventory).	

NRS Note: PRESENT NONFOREST LAND USE is recorded on all plots that are either entirely nonforest or contain both a forested and a nonforested condition.

2.5.24.1N NONFOREST TREES

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 and are considered inclusions.

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.

    NRS Note: Improved roads may contain restricted access such as gates or berms. Indications that roads are NOT regularly maintained may include long-term evidence of unrepaired gullies, washouts, deep ruts, blowdowns, or the establishment of vegetation on the road bed that would restrict normal vehicle traffic.

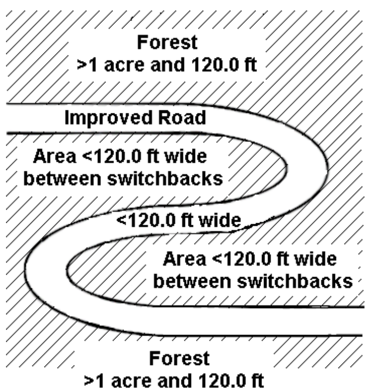


Figure 5. Example of a switchback road. All the cross-hatched area is forest and the improved road is a nonforest condition.

    (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.

    NRS Note: Rights-of-way that do not exclude other existing non-forest land uses such as cropland or pasture shall not be classified as rights-of-way. A power line that crosses a pasture at least 1 acre in size and 120 feet in width would be classified as pasture because there is no maintenance under the power line to preclude the existence of the pasture. Similarly, if a power line passes through accessible forestland, but is not maintained, the power line would not be recognized as a nonforest Condition Status because it does not preclude the existence of the accessible forestland.

Trees that are growing into live power lines create an unsafe work environment and must be considered as part of a hazardous condition.

(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.

NRS Note: Intense human activity such as developed campgrounds would be considered nonforest. However, recreation trails used for snowmobiling, sking, biking, or hiking would be considered an inclusion in the surrounding condition.

NRS Note: Improved roads, R.O.W. and noncensus water that are less than 120.0 feet in width do not necessarily break up a forest condition that are between "switchbacks" as shown in Figure 5. Other regional variations of the "switchback" rule can be found in Regional Appendix C. In other situations as shown in Figure 6N, where there is an improved R.O.W, development or noncensus water, a strip of forest land may have minimum width of 30.0 feet and minimum length of 120.0 feet as long as there is "qualifying" accessible forest land that lies across from the nonforest strip. See Figure 6N. Since the forest strip cannot be delineated as its own condition, the condition variables are determined from the "qualifying" accessible forest land.

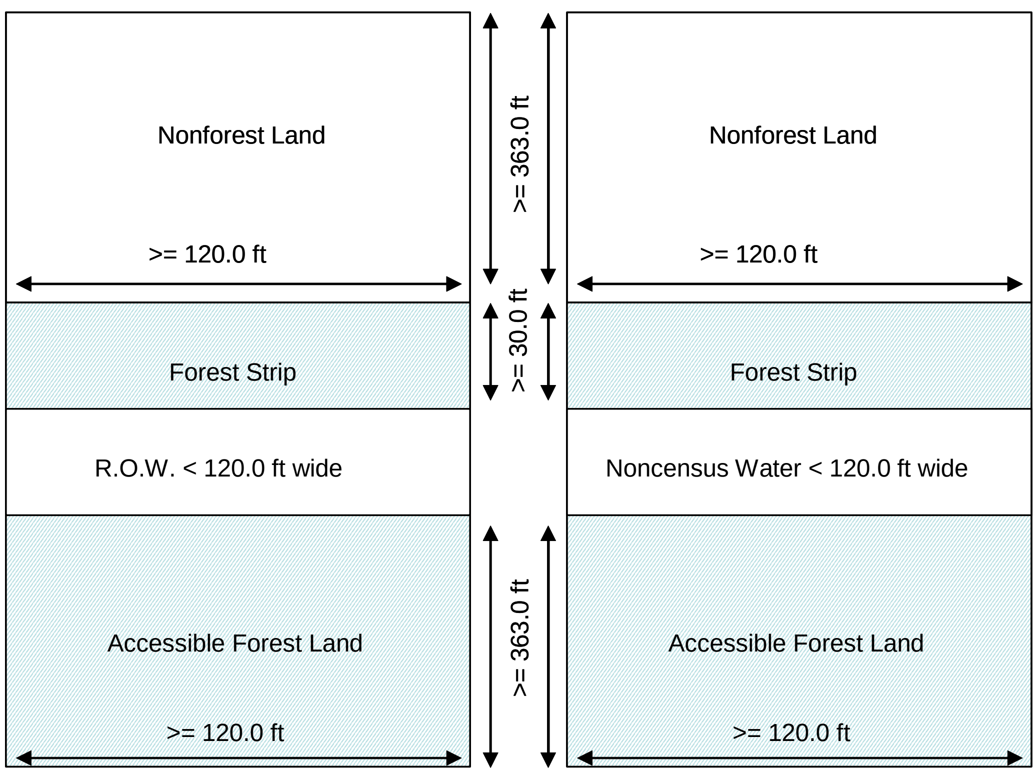


Figure 6+N. Example of nonforest and forest strips when the nonforest strip is developed (e.g., R.O.W or areas with structures), or noncensus water. Otherwise, see Figure 7b+N.

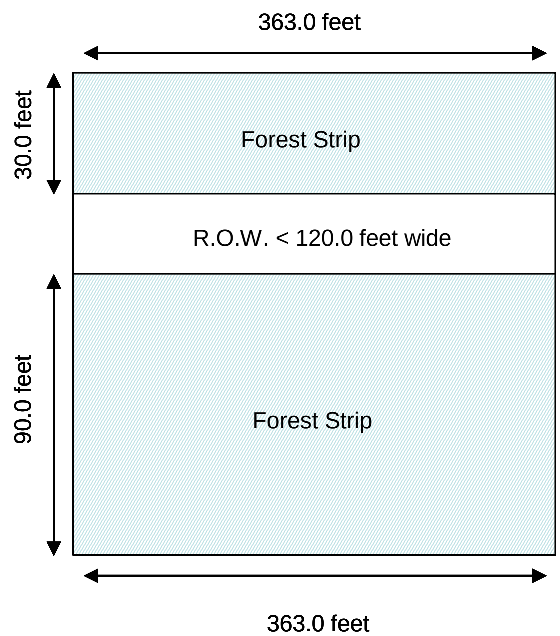


Figure 6.1N. Two forest strips exist on either side of a R.O.W. The R.O.W. is it's own condition, however, a developed condition can be jumped if less than 120.0 ft in width. The width or the R.O.W. cannot be used to measure the overall width of the forest. If the combined forest strips measure to be at least 120 ft in width and 363 ft in length, then the combined strips can be defined as accessible forest land.

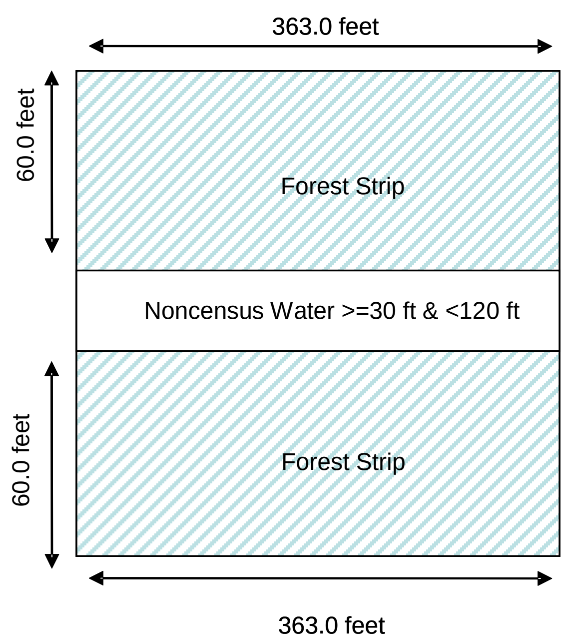


Figure 6.2N Two forest strips exist on either side of noncensus water. The noncensus water is it's own condition, however, noncensus water can be jumped if less than 120.0 ft in width. The width or the noncensus water cannot be used to measure the overall width of the forest. If the combined forest strips measure to be at least 120 ft in width and 363 ft in length, then the combined strips can be defined as accessible forest land.

NRS Note: The preceding two illustrations show a procedure to combine two forest strips in order to achieve the minimum width and acreage for accessible forestland. This is in contrast to Figure 6N which shows accessible forest land (i.e., 1 acre and 120.0 ft) adjacent to the nonforest "developed" strip or noncensus water. In both figures, the width of the nonforest condition is not used to measure overall width since these represent a separate CONDITION CLASS STATUS. As in Figure 6N, a forest strip must be at least 30.0 feet in width. Strips of trees less than 30.0 feet in width are treated as inclusions of the adjacent nonforest condition when the adjacent condition is nonforest. Strips of trees less than 30.0 feet in width are treated as inclusions in the adjacent forested condition when the adjacent condition is accessible forestland. This also holds true if the adjacent forest land is of a different forest type than the strip.

2. Distinct, alternating strips of forest and nonforest land: this situation occurs when a plot or subplot samples a condition class that is less than 1.0 acre in size and less than 120.0 feet in width. The condition class is one of a series of parallel strips of forest and nonforest land in which none of the strips meet the minimum width requirement. This exception applies only to nonforest land conditions that are not listed under #1, e.g., improved roads, maintained rights-of-way, and developments (fig. 6).

   (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. See Figure 7a+N.

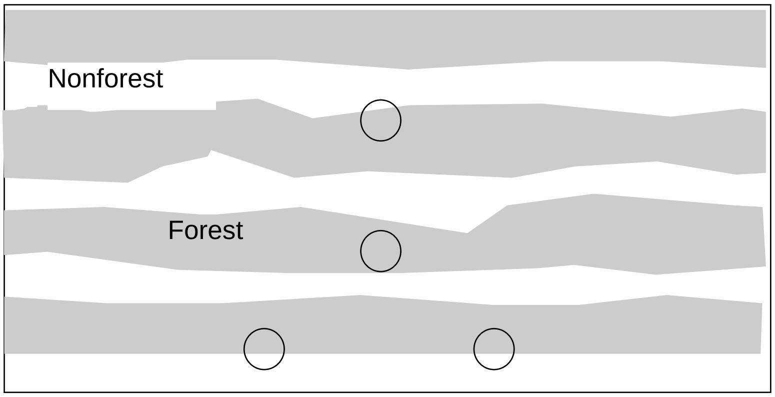


Figure 7a+N. Entire plot area consists of strips of forest and nonforest land. None of the strips meets the 120 ft minimum width to qualify as a separate land use and the nonforest strips are not developed nonforest conditions. In this example, the entire area is classified as forest since the sum of the areas occupied by the forest land use exceeds the sum of the nonforested area in this example.

   (b) Two alternating strips: For two alternating strips of forest and nonforest between two qualifying areas of nonforest land and forest land, see figure 7b+N. Figure 7 b+N 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. If either strip of land is less than 30.0 feet wide, then the strip is treated as inclusion of the surrounding or adjacent condition. Note: The nonforest strip in Figure 7b+N is not "developed" as described in Exception 1 and shown in Figure 6+N. See Regional Appendix C for more regional Figure 7b+N illustrations.

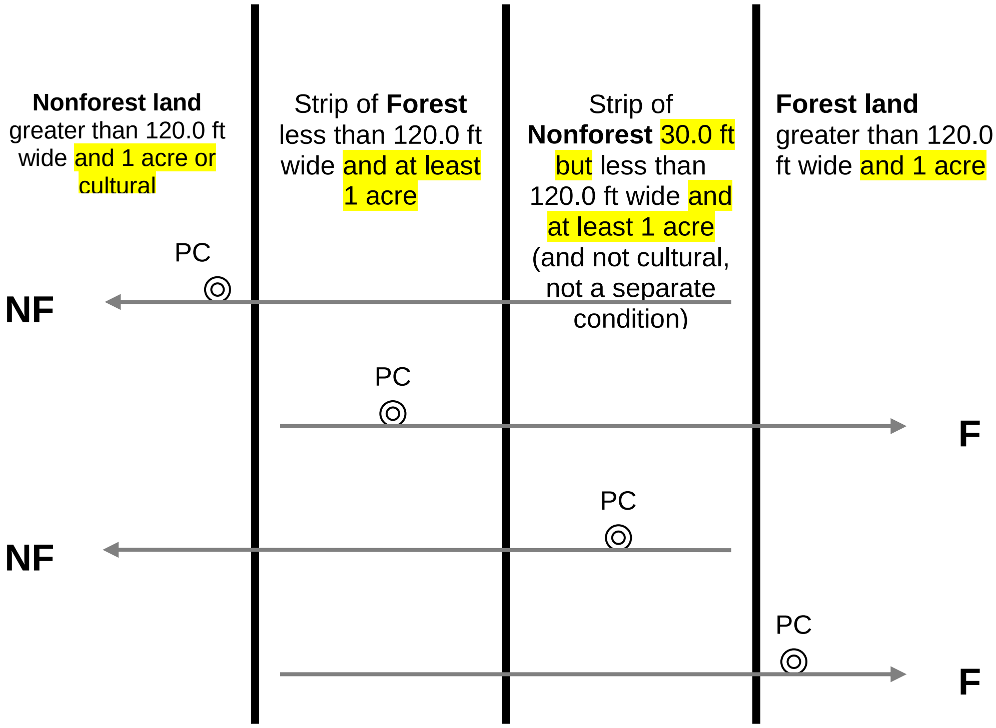


Figure 7b+N. Example of alternating strips of forested and nonforested conditions (that is neither a developed feature as indicated in "Exception 1" nor linear noncensus). PC is the plot center (center of subplot 1) and the strips are treated as either F or NF based on this location.

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

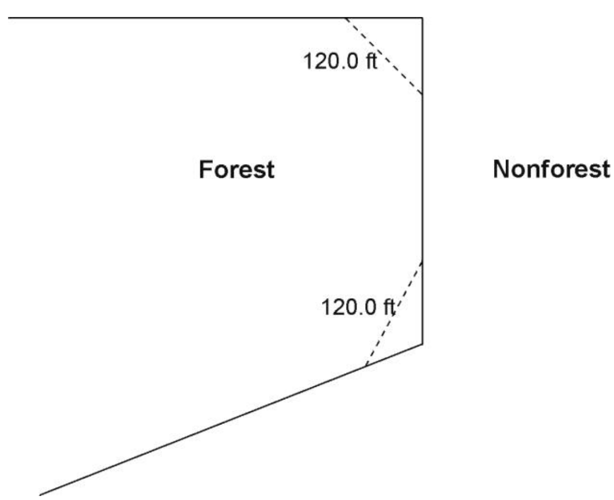


Figure 8. Illustration of the 90 degree corner rule. The dotted lines do not create nonforest land conditions.

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.

   NRS Note: A linear water feature “prevents the establishment and survival of trees” when trees cannot develop beyond seedling size. Once a seedling reaches 1.0 inches in diameter it is considered established. In the absence of established trees to aid in defining the edges of the linear water feature, use the mean high water mark.

   NRS Note: Linear water features must also cover 1 acre while maintaining the 30.0 foot width requirement.

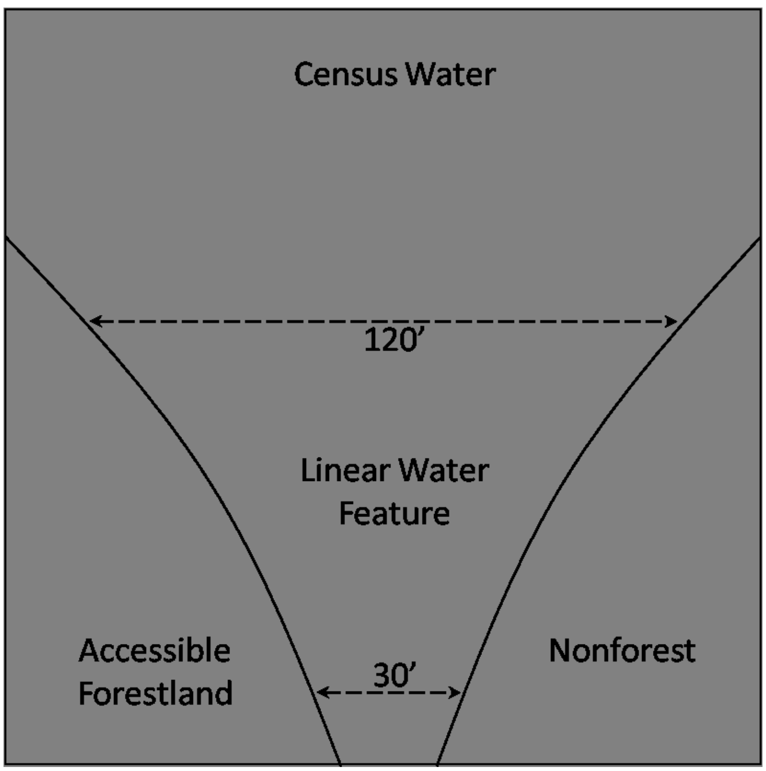


Figure 8.1N. Although dimensional requirements for bodies of water and linear features are distinct, there may be instances where a linear Noncensus Water feature (or narrow finger of a body of water) feeds into a body of Census or Noncensus Water. In these cases, the linear feature will be mapped only if it meets the 1 acre size requirement, excluding any acreage that otherwise would qualify as Census or Noncensus water for the body. Specifically, only the acreage between the 30' minimum

width for linear features and the 120' minimum width for bodies of water would be considered.

If the minimum acreage is not met, the linear feature (or narrow finger of a body of water) is considered part of the adjacent Nonforest condition. In a similar context, if Accessible Forestland boarders both sides of the linear feature that does not meet the minimum acreage; the linear feature is considered part of the surrounding Forestland.

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

NRS Note: If the previous crew's data can be justified and is **correct** then we would like to keep CONDITION DATA consistent over time. Record the previous crew's CONDITION DATA for RESERVED STATUS, FOREST TYPE, REGENERATION STATUS, and PHYSIOGRAPHIC CLASS. Adjust STAND AGE and STAND SIZE CLASS to reflect growth changes. The previous crew's calls are printed on the plot sheet.

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

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 on a subplot following the standard numeric progression through the four points.

NRS Note: On remeasurement plots, conditions are renumbered to reflect current conditions (i.e., CONDITION CLASS = 1 always represents subplot 1's plot center).

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 **[CDST]**

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.
NRS Note: When defining conditions on subplots that include a nonsampled condition, see Split Subplot procedures in Regional Appendix C.

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 **[REAS]**

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.
NRS Note: If a denied access plot or subplot can be ground-truthed as nonforest from adjacent accessible property, code the plot or subplot as nonforest.

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.
NRS Note: If a hazardous plot or subplot can be ground-truthed as nonforest from adjacent safe ground, code the plot or subplot as nonforest.

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.
NRS Note: When a Subplot Center cannot be occupied because it falls under a building, code 10 (Other) for CONDITION NONSAMPLED REASON.

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).

NRS Note: Nonforest inventories are not conducted in our region, i.e. NONFOREST SAMPLING STATUS = 1.

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 cannot be sampled (NONFOREST CONDITION CLASS STATUS = 5), record one of the following reasons.

NRS Note: Nonforest inventories are not conducted in our region, i.e. NONFOREST SAMPLING STATUS = 1.

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. Distinct boundary within a macroplot (if applicable), subplot, or microplot – Separate condition classes ARE recognized if, within a subplot, two (or more) distinctly different condition classes are present and delineated by a distinct, abrupt boundary. The boundary is referenced; see Section 4.0.

2. Indistinct boundary within a subplot – Separate condition classes are NOT recognized if the prospective condition classes abut along an indistinct transition zone, rather than on an abrupt, obvious boundary. Only one condition is recognized, and the subplot is classified entirely as the condition it most resembles.

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

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

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

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

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

adjacent accessible forest land condition class. Figures 9-14 provide examples of when to delineate riparian forest area as a separate condition class. In these figures, forest type "A" qualifies as its own condition (> 120. feet and > 1 acre). The riparian area represented by forest type "B" qualifies as its own condition if the area is between 30.0 and 120.0 feet and is > 1 acre. In addition, see Figure 14.1N Riparian Flowchart.

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.

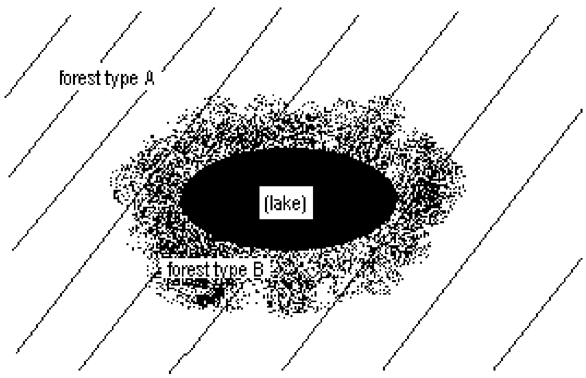


Figure 9. Forest type B is a separate condition class (riparian) if the band of it is between 30.0 feet and 120.0 feet wide, and is ≥ 1.0 acre in size.

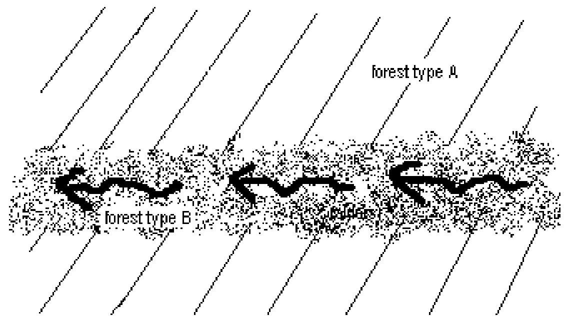


Figure 10. Forest type B is a separate condition class (riparian) if the band of it is between 30.0 feet and 120.0 feet wide, and is ≥ 1.0 acre in size.

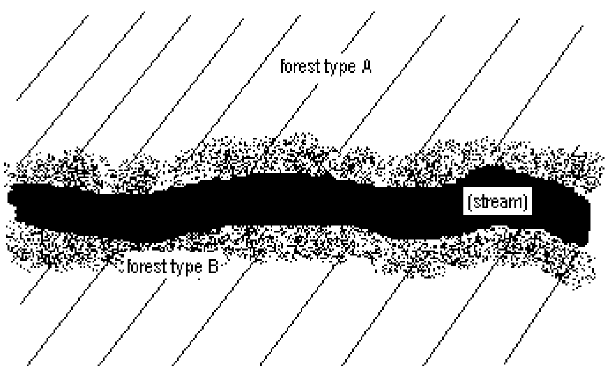


Figure 11. If the stream is < 30.0 feet wide, forest type B is a separate condition class (riparian) if the sum of the two widths of the bands, including the stream falls between 30.0 feet and 120.0 feet wide, and is ≥ 1.0 acre in size.

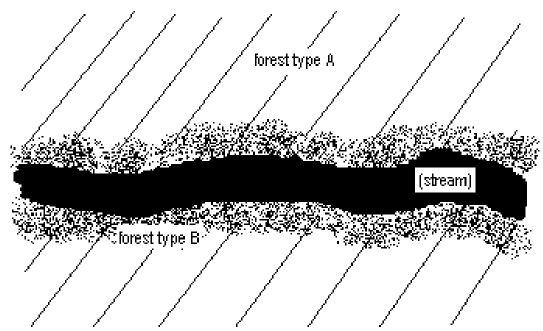


Figure 12. If the stream is > 30.0 feet wide, forest type B is a separate condition class (riparian) if either of the two widths of the bands falls between 30.0 feet and 120.0 feet wide and is ≥ 1.0 acre in size.

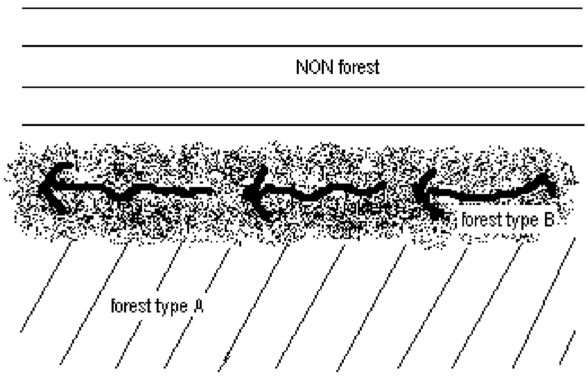


Figure 13. Forest type B is a separate condition class (riparian) if the band of it is between 30.0 feet and 120.0 feet wide, and is $\geq$ 1.0 acre in size.

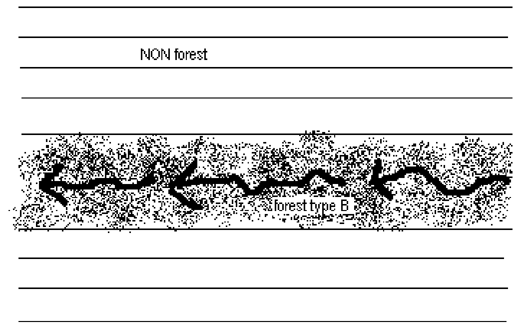


Figure 14. In a nonforested area, a band of forest type B that is < 120.0 feet wide is NOT considered a riparian area. It is not a separate condition class at all.

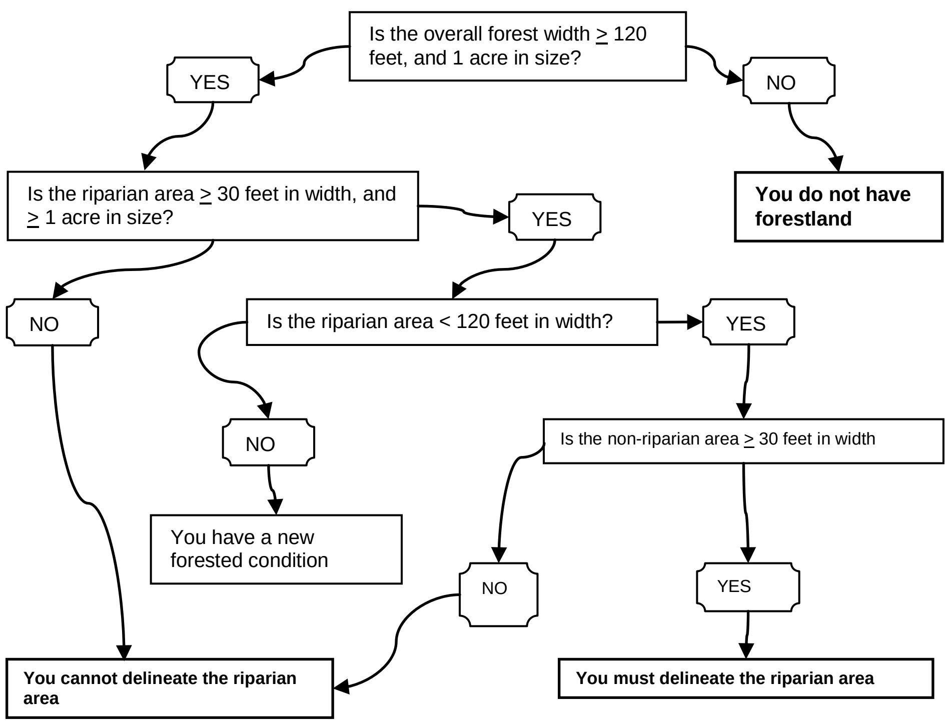


Figure 14.1N. Riparian Delineation Flowchart

2.5.1 RESERVED STATUS **[RESV]**

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.

NRS Note: RESERVED STATUS is code as 0 for all private land (OWNER GROUP = 40) regardless of conservation easements that may restrict harvesting. All public land requires documentation in the PLOT NOTES of RESERVED STATUS in the data recorder. This designation removes the associated forest into noncommercial forest land. See Regional Appendix C for additional instructions about documentation procedures for reserved public land.

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 **[OWNG]**

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.

NRS Note: When OWNER GROUP = 40 at subplot 1's plot center, owner name and address data are required. See Regional Appendix B for ownerships data collection procedures and required regional owner variables.

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 **[FTYP]**

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

NRS Note: When determining FOREST TYPE, first try to match the plurality of the stocking present with the "named" type. If the "named" type does not match the plurality of the stocking in the stand, match the plurality of the stocking in the stand with the trees listed as associates under each type even if the "named" type species are not represented in the plurality of the stocking present.

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

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

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

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

2.5.4 STAND SIZE CLASS **[STSZ]**

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

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

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

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

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

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

2 5.0 – 8.9 inches (softwoods) / 5.0 – 10.9 inches (hardwoods)
At least 10 percent stocking (or 5 percent crown cover if stocking standards are not available) in trees of any size; and at least 1/3 of the crown cover is in trees greater than 5.0 inches DBH/DRC **and** the plurality of the crown cover is in softwoods between 5.0 – 8.9 inches diameter and/or hardwoods between 5.0 – 10.9 inches DBH, and/or woodland trees 5.0 – 8.9 inches DRC.

3 9.0 – 19.9 inches (softwoods) / 11.0 – 19.9 inches (hardwoods)
At least 10 percent stocking (or 5 percent crown cover if stocking standards are not available) in trees of any size; and at least 1/3 of the crown cover is in trees greater than 5.0 inches DBH/DRC **and** the plurality of the crown cover is in softwoods between 9.0 – 19.9 inches diameter and/or hardwoods between 11.0 – 19.9 inches DBH, and for woodland trees 9.0 – 19.9 inches DRC.

4 20.0 – 39.9 inches
At least 10 percent stocking (or 5 percent crown cover if stocking standards are not available) in trees of any size; and at least 1/3 of the crown cover is in trees greater than 5.0 inches DBH/DRC **and** the plurality of the crown cover is in trees between 20.0 – 39.9 inches DBH.

5 40.0 + inches
At least 10 percent stocking (or 5 percent crown cover if stocking standards are not available) in trees of any size; and at least 1/3 of the crown cover is in trees greater than 5.0 inches DBH/DRC **and** the plurality of the crown cover is in trees $\geq$ 40.0 inches DBH.

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

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

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

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

2.5.5 REGENERATION STATUS **[SORI]**

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

NRS Note: Artificial regeneration must be at least 1 acre and at least 120.0 feet in width.

NRS Note: Underplanting is considered artificial regeneration.

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

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

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

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

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

2.5.6 TREE DENSITY **[DENS]**

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

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

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

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

When collected: All accessible forest land condition classes (CONDITION CLASS STATUS = 1)
Field width: 1 digit
Tolerance: No errors

MQO: At least 99% of the time
Values:

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

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

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

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

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

Ancillary (Non-Delineating) Variables

2.5.7 OWNER CLASS **[OWNC]**

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 (Including the Army Corps of Engineers)
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 (including private educational institutions)
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 **[INDU]**

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.

NRS Note: Wood processing plants must be within a reasonable haul distance from the plot as well as located within the United States.

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 **[SOSP]**

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 **[SAGE]**

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

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

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

$(34 \times 0.25) + (62 \times 0.60) + (59 \times 0.15) = 55$ 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.

NRS Note: Boring or drilling on plots located in Wilderness areas on National Forests will be done on representative non-tally trees and only when absolutely necessary to estimate site, age, or growth. (This will generally be the case during initial establishment of permanent plots.) [SERVICEWIDE AGREEMENT 09-SA-FIA01]

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 (999 is not applicable in our region)

2.5.11 DISTURBANCE 1 **[DIS1]**

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.

NRS Note: Although only Disturbances that have occurred within the last 5 years are considered, Disturbances that are ongoing will still be recorded if they originated more than 5 years prior to the current inventory so long as the Disturbance continues to meet the specified “significant threshold”.

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 such as a catastrophic event like a hurricane or other major rain event. Periodic flooding that occurs as part of the natural forest ecosystem should not be coded.)
- 54 drought

60 Vegetation (suppression, competition, vines)
NRS Note: Stand maturity, along with the characteristics of the tree species present, are considered while evaluating any impact that suppression or competition may have on understory vegetation. Suppression and or competition may be caused by both native and non native vegetation. See Regional Appendix C for examples of Understory Vegetation as a Disturbance.

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 **[DYR1]**

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

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

2.5.13 DISTURBANCE 2 **[DIS2]**

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

2.5.14 DISTURBANCE YEAR 2 **[DYR2]**

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

2.5.15 DISTURBANCE 3 **[DIS3]**

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

2.5.16 DISTURBANCE YEAR 3 **[DYR3]**

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

2.5.17 TREATMENT 1 **[TRE1]**

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 due to a silvicultural operation that affects 1 acre or more. Cutting does not include occasional stumps of unknown origin or sparse removals for firewood, Christmas trees, or other miscellaneous purposes. If Cutting is coded, ensure that consideration is given to Artificial or Natural regeneration if it has occurred within the past 5 years.
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, noncommercial thinning 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 **[TYR1]**
Record the year in which TREATMENT 1 occurred.

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

2.5.19 TREATMENT 2 **[TRE2]**
If a stand has experienced more than one treatment, record the second treatment here. See TREATMENT 1 for coding instructions; code 00 if none.

2.5.20 TREATMENT YEAR 2 **[TYR2]**
Record the year in which TREATMENT 2 occurred. See TREATMENT YEAR 1 for coding instructions.

2.5.21 TREATMENT 3 **[TRE3]**
If a stand has experienced more than two treatments, record the third treatment here. See TREATMENT 1 for coding instructions; code 00 if none.

2.5.22 TREATMENT YEAR 3 **[TYR3]**
Record the year in which TREATMENT 3 occurred. See TREATMENT YEAR 1 for coding instructions.

2.5.22.2N-ME STAND STRUCTURE **[MEST]**
See Regional Appendix D for state and/or species specific variable data collection procedures and codes.

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

NRS Note: Record the previous PHYSIOGRAPHIC CLASS as current if the previous crew's call can be justified. The previous crew's call is printed on the plot location sheet.

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.

<u>Hydric</u> 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 <u>Swamps / Bogs</u> - 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 <u>Small Drains</u> - 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 <u>Bays and wet pocosins</u> - 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. (See National Appendix 6+N – GLOSSARY for definitions of bays and pocosins.)

34 <u>Beaver ponds</u>

35 <u>Cypress ponds</u>

39 <u>Other hydric</u> - All other hydric physiographic sites.

2.5.23.1N PRODUCTIVITY STATUS **[PROD]**

Record the code that indicates the productivity of the forest condition.

Productivity is determined by the Site Index of the best tree in the condition, even if the best tree does not match the FOREST TYPE. Ignore trees that are growing on unique micro sites within the condition that do not represent the condition as a whole, such as a small island of upland terrain surround by lowland. For example, it would be acceptable to use a productive paper birch for a site tree in a stand of unproductive black spruce as long as the birch was **not** growing on a small drier hump not representative of the overall condition which is wet sphagnum mosses.

A forest land productivity table with limited species can be found in Regional Appendix E as an aid for determining productivity. In addition site index can be used as an indicator of productivity in the WEST by using provided western site index curves. (Note: These site index curves are available as regional supplement to this field guide.) If the site index meets the minimum value indicated below for that species, the forest is considered productive.

Species	Name	Minimum SI Value
0066	Rocky Mountain juniper	25
0068	eastern red cedar	25
0071	tamarack	20
0095	black spruce	20
0122	Ponderosa pine	21
0241	northern white cedar	15
	Other SI species available	35

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

0 Unproductive – Forest land incapable of producing 20 cubic feet per acre per year because of adverse site conditions. Adverse conditions include sterile soils, dry climate, poor drainage, high elevation, steepness, and rockiness. Vegetation, if present, is widely spaced and scrubby, or tree growth cannot be established. These conditions can be due to forces of nature or human-caused disturbances.

1 Productive – Forest land capable of producing in excess of 20 cubic feet per acre per year. Productive forest land may be nonstocked provided that neither any natural condition, nor any activity by humans, prevents or inhibits the establishment of tree seedlings.

2.5.24+N PRESENT NONFOREST LAND USE **[NFLU]**

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.

NRS Note: The Northern region will record this attribute on all conditions with nonforest land.

When CONDITION CLASS STATUS = 2, PRESENT NONFOREST LAND USE is required. However, the delineation of multiple nonforest land uses is not required. When CONDITION CLASS STATUS = 2, the first nonforest land use delineated on a subplot in numeric order is recorded for the entire plot. Additional nonforest land uses are not delineated.

At times a CONDITION CLASS STATUS 2 condition may be made up of multiple nonforest landuses, some of which may not be an acre in size. In this case record the first nonforest land use that you encounter, regardless of size.

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.) with the exception of the regional land use windbreak/shelterbelt. A windbreak or shelterbelt can be less than 120.0 feet wide and less than 1 acre. If a windbreak or shelterbelt qualifies and meets the definition of accessible forest land, then it is not considered nonforest. 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 / Nursery
- 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 and wasteland

NRS Note: Code 34 must be at least 1 acre in size and 120.0 feet in width.

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

The following are regional definitions developed for both national and regional sub-codes. Use these codes in conjunction with CONDITION CLASS STATUS 2.

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

12 – IMPROVED / MAINTAINED PASTURE
Land maintained and used and for grazing with stocking less than 10 percent in live trees (established saplings or larger trees), except that occasional large trees with the obvious function of providing shade for livestock, and small single trees or clusters should be ignored when determining stocking. Evidence of maintenance, besides the degree of grazing, includes condition of fencing, presence of stock ponds or water tanks. Land also periodically brush hogged indicated by seedlings 3 to 4 feet in height and basal scars present on trees.

13 – IDLE FARMLAND
Former cropland or pasture that has not been tended within the last 2 years and that has less than 10 percent stocking with live trees, (established seedlings or larger trees) regardless of species. A field that is between crop rotations should NOT be called Idle Farmland.

14 – ORCHARD/NURSERY
Land utilized for orchards and nursery stock.

15 – CHRISTMAS TREE PLANTATION
Active Christmas tree plantation must show signs of annual shearing. Record tree species used in the plantation in the PLOT NOTES.

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

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

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

32 – RIGHTS-OF-WAY
Highways, railroads, airports, pipelines, gas/oil wells, or power lines. The following are not considered a R.O.W.

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

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

33 – RECREATION
Parks, campgrounds, playing fields, athletic, sports tracks, etc.

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

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

Bogs are not always nonforest. Some tree species such as black spruce can adapt to bog conditions. If the stocking requirement is met, the land is considered forest land. The decision as to whether the land is productive or unproductive will be made by the field crews.

Swamps are not always nonforest. Some tree species readily adapt to the swamp conditions. If the stocking requirement is met, the land is considered forest land. The decision of whether the land is productive or unproductive will be made by the field crews. Drained beaver ponds that are not stocked are included in this category.

43 – BEACH
Sandy or pebbly shore associated with an ocean or lake.

2.5.24.1N NONFOREST TREES **[NFTR]**

Record the presence or absence of **live** trees > 5.0 in DBH that are within the nonforest condition represented in the "plot triangle." The plot triangle is formed by the three outer subplots and represents approximately .84 acres. The plot triangle correlates with the regional office photo interpretation that assesses whether or not a plot is sent to the field for data collection. For example, a plot that is determined to be a nonforest PLOT STATUS (as shown in Figure14.2N "A") is not sent to the field. However, any plot that the interpreter questions the PLOT STATUS (e.g., partial forest land, reversion, or an outer subplot is within 66 feet of forest land) is sent to the field for verification of status. (Note: These questionable status plots are not part of the nonforest QA/QC plot sample. The nonforest QA/QC plot sample includes only those plots that the interpreter assigned a PLOT STATUS = 2.)

To assess the presence or absence of trees, consider only those **live** trees represented within the plot triangle that is in a nonforest condition. See Figure 14.2N "A or B". If the nonforest plot or subplot can be occupied without a substantial time investment (i.e., easy access including owner contact and traversing), then ground observation is used. If the nonforest plot or subplot cannot be occupied, then aerial photo interpretation and/or ground observation is allowed.

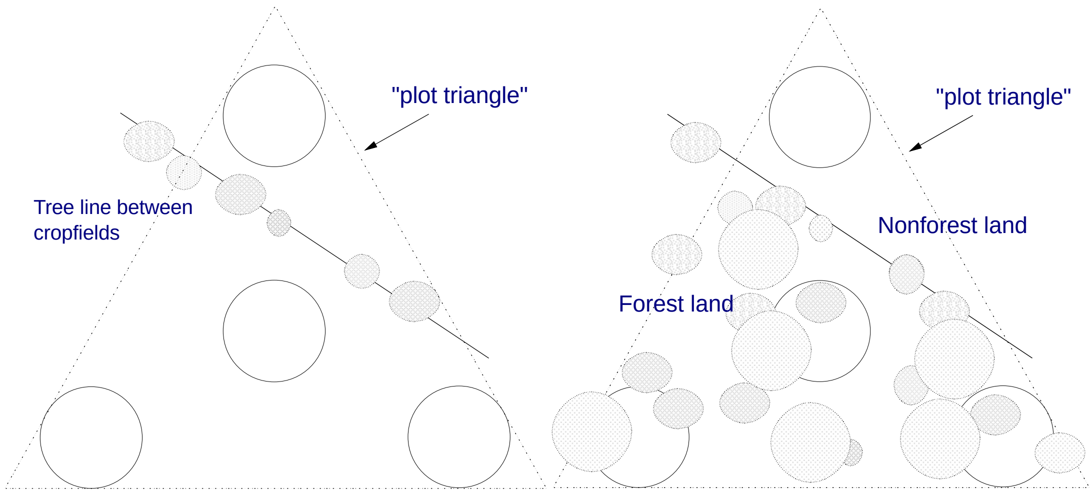


Figure A. Entire plot is classified as nonforest land with trees.

Figure B. Subplots 1, 3 and 4 classified as forest land. Subplot 2 classifed as nonforest land without trees.

Figure 14.2N

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

1	Nonforest land without **live** trees > 5.0 in DBH
2	Nonforest land with **live** trees > 5.0 in DBH

2.5.25N CANOPY COVER and STEM variables overview:

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

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

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

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

Condition status 2 conditions for both LIVE AND LIVE PLUS MISSING CANOPY COVER:

Ocular method - If LIVE PLUS MISSING CANOPY COVER is 0% OR >12% OR any time the condition is developed for a non forest land use OR any time the condition did NOT require a stocking check to determine its' CONDITION STATUS.

Subplot method - If LIVE PLUS MISSING CANOPY COVER is >0% and <12% AND the condition did require a stocking check to determine its' CONDITION STATUS.

Sub-acre method - If LIVE PLUS MISSING CANOPY COVER is >0% and <12% AND the condition did require a stocking check to determine its' CONDITION STATUS AND the condition's size / shape does not allow complete plot instillation using the Subplot method.

NRS will utilize the following procedures to determine the TOTAL STEMS variable. For both Condition Status 1 and 2, TOTAL STEMS will be determined by the STEMS calculator in the PDR based on the actual stem count tallied on subplots and mircoplots 1-4. The STEMS calculator will provide an option to override this calculation and enter an estimated STEM count based on field observations, but NRS policy is to only accept the STEM value produced by the calculator.

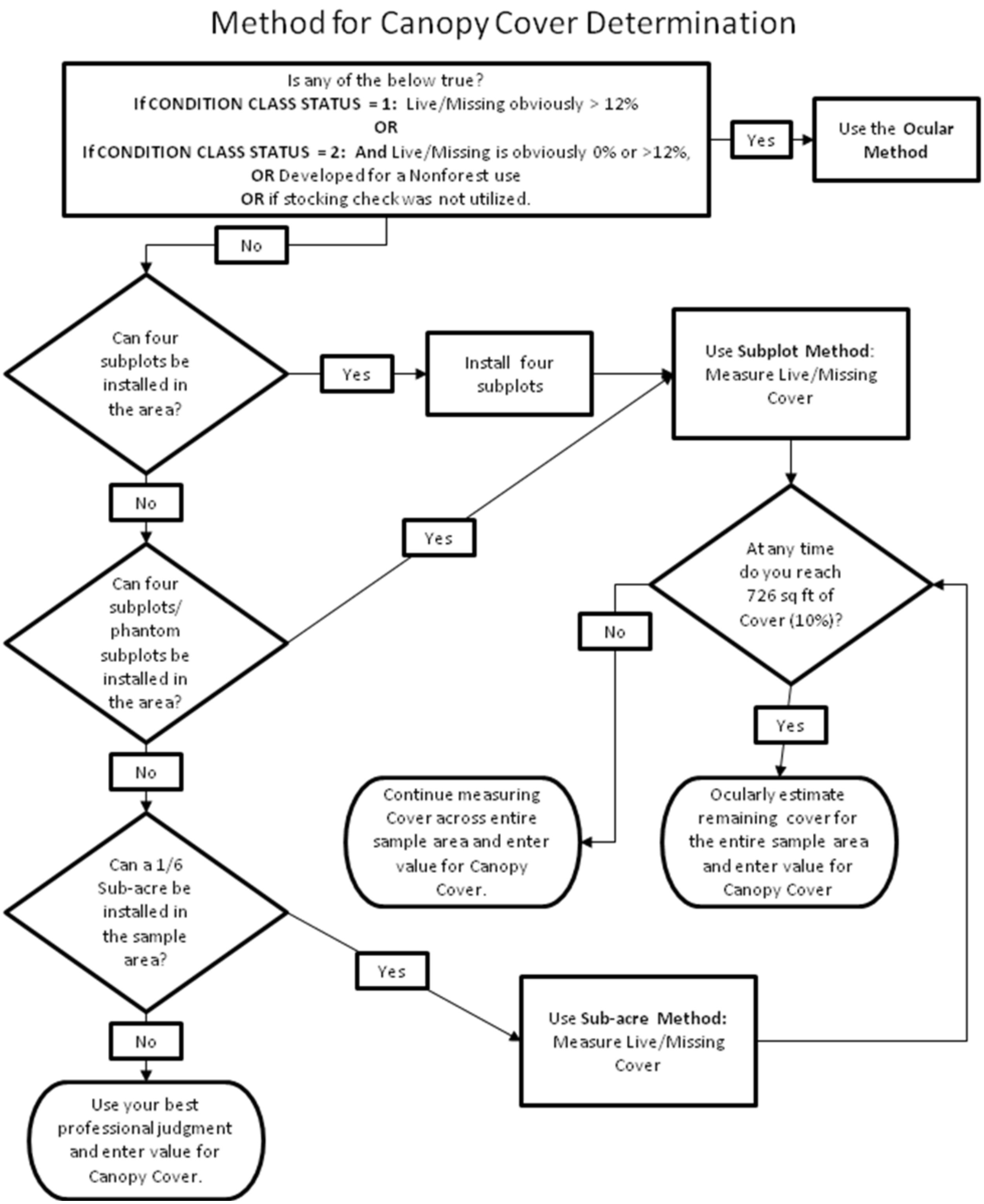


Figure 15N. CANOPY COVER SAMPLING METHOD flowchart.

2.5.25+N CANOPY COVER SAMPLE METHOD **[CCSM]**

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 where 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 visual acre of the condition in question, without regard to the locations of the stems supporting the canopy over the plot.

See NRS Note below Figure 15 for guidance on locating the "visual acre surrounding Plot Center"

NRS Note: National defined "phantom subplots" are the equivalent to NRS defined "temporary subplots".

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.

   NRS Note: Seedlings and Saplings are counted in COVER calculations across the whole subplot, **not just the microplot**.

   NRS Note: TOTAL STEMS are calculated based on actual stem tally on points 1-4 in the PDR, no additional input by the crews is needed.

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 with pins/dowels and flagging. Include reference trees (>3" DBH when they are available or otherwise trees <3" DBH may be used) along with their distance and azimuth from '*X*' subplot. 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.

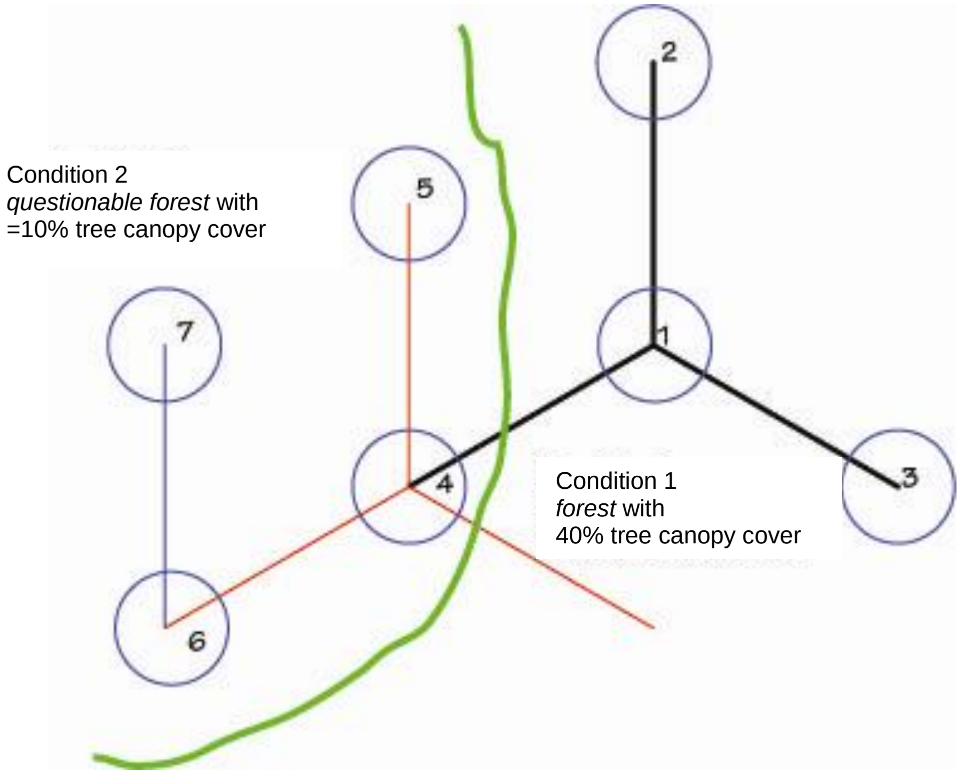


Figure 15. Example of the subplot method with phantom subplots.

NRS Note: **When using the Ocular method** to estimate LIVE and LIVE PLUS MISSING CANOPY COVER for conditions that do not contain four full Subplots, use the visual acre surrounding the estimated location of your phantom subplots. In Fig 15, the visual acre would be the acre surrounding Subplots 4 through 7 for Condition 2. If Condition 1 is being estimated, install a phantom Subplot 120' North of point 3 (in order to ensure that there are 4 full Subplots within the condition in question). The visual acres for condition 1 would then represent the area around the three subplots and one phantom plot in Condition 1.

NRS Note: If a portion of a plot falls in a Condition that is clearly Status 2 and the remaining portion falls in a reverting field of marginal stocking, 4 subplots/phantom subplots will need to be installed in the reverting field to check for stocking. If the results turn out to be non-stocked, the plot as a whole is defined as one Status 2 Condition. With only one Condition, the phantom subplots will be ignored and the Canopy estimates for the plot as a whole will be based on the original four 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, at which point crews may estimate the remaining canopy cover on the plot. 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 ($\geq$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.

NRS Note: The Acre method will not be used when determining Canopy Cover in our region.

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).

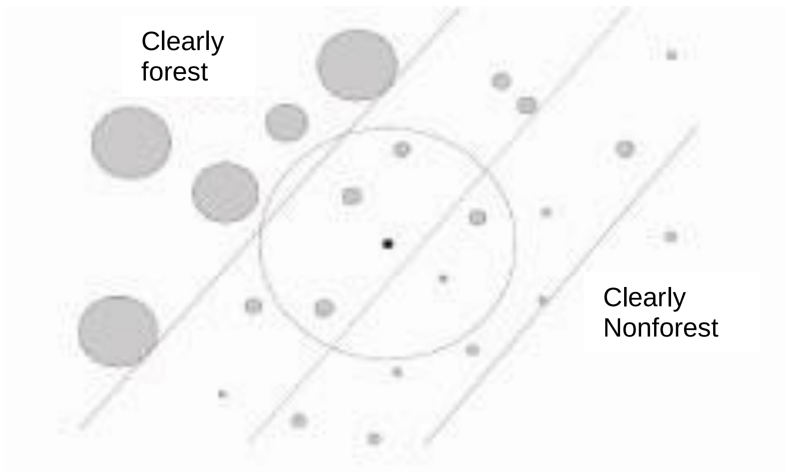


Figure 16. Example of classifying the condition class of the subplot in a transition zone with forest/Nonforest encroachment.

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 cannot 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 greater for 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+N LIVE CANOPY COVER **[LCC]**

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))**.

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

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

- Hardwood seedlings must have a length of at least 1 foot and softwoods a length of at least 6" to be included in canopy cover.

- Ignore crowns from trees, saplings, and seedlings whose stems originate outside of the SUB PLOT area. These invading crowns can NOT overtop crowns originating within the SUB PLOT area.

- Grasses, herbs, shrubs, and non tally tree species are not considered when determining whether a crown is overtopped.

- Only include tree canopy measurements from trees with stems that originate within the sample area, although canopy measurements can extend outside the sample area. NRS Note: When a clump of trees are encountered within a subplot their combined crown can be measured as one unified crown. When stems from a clump of trees falls outside the subplot area, ignore the canopy cover associated with these stems.

- Trees, saplings, and seedlings originating within the entire SUB PLOT area are counted in this process.

- 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.

- Do not compact canopy axis measurements (with exception of abnormal branches) even if trees are sparsely leafed. Canopy axis measurements are not compacted and are measured to the end of the branches regardless of how sparsely leafed the branches are.

- For leaning trees, ocularly upright the trees and measure crowns as if the trees were upright. For leaning/fallen trees whose current canopy position is part of the Canopy Cover, take its axis measurements as it would be if it were standing up. Do not count any canopy cover of any seedlings/saplings that are being overtopped by the fallen tree in its current position. However, if the leaning/fallen tree is overtopped by other trees/saplings, the over topped part of the fallen tree’s canopy would not be added to the Canopy Cover estimate.

- Approximately 925 seedlings with a canopy width of 1’x1’ or less must be counted across all four subplots in order to reach 10% Cover (726 ft^2 of Cover).

- A tree with a canopy width of approximately 31’x30’ is approximately 10% Cover (726 ft^2 of Cover).

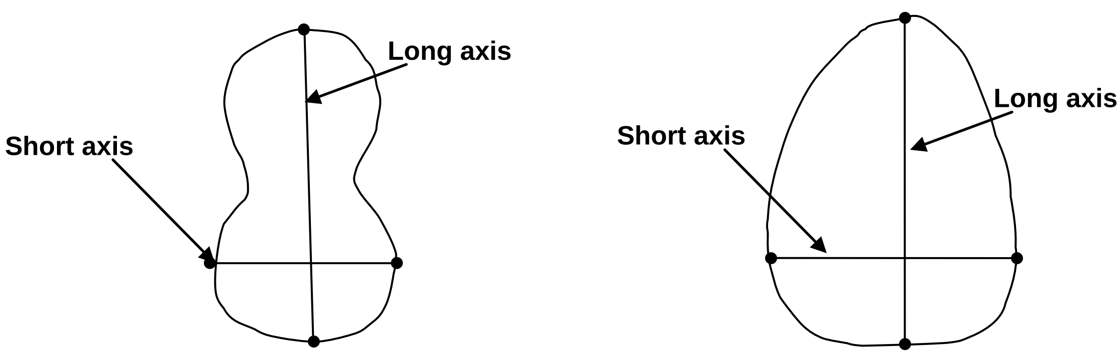


Figure 17. Examples of where to measure canopy widths.

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+N LIVE PLUS MISSING CANOPY COVER **[LMCC]**

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%.

NRS Note: MISSING CANOPY COVER is any loss of canopy due to a DISTRUBANCE or TREATMENT such as fire, windthrow, harvest, or other causes, at any time in the past, which is not associated with a land use conversion. The estimate of MISSING CANOPY COVER must be based on some evidence of the past canopy cover, as indicated by stumps and snags, or trees on adjacent undisturbed sites. DISTRUBANCE is defined in section 2.5.11 and TREATMENT is defined in section 2.5.17.

- Dead portions of live trees are not considered as missing unless it is part of the condition DISTURBANCE

- Stumps and dead trees are not considered unless they originate within the sample area and are a direct result of a defined DISTRUBANCE OR TREATMENT.

- Do not double count canopy layers; Any live canopy supercedes any presense of missing canopy; Ignore portions of missing canopy that have live trees, saplings, and seedlings below them.

- Use your best professional judgment when estimating missing crowns from stumps. Take into consideration the spacing of the stumps and the size of any possible remaining live crowns in the area. Also ensure that your estimated missing crown is not overtopping any live crown cover when estimating missing cover.

NRS Note: If a DISTURBANCE prevents the establishment and survival of trees, such as in cases where land is converted to a marsh by a beaver dam, only LIVE CROWN CANOPY will be counted towards LIVE PLUS MISSING CANOPY COVER

NRS Note: LCC and LMCC receive the same values when CONDITION CLASS STATUS = 2.

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+N TOTAL STEMS **[STEM]**

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

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

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.

Subplots 2, 3 and 4 are located 120.0 feet horizontal (+/- 7 feet tolerance for initial establishment) at azimuths of 360, 120 and 240 degrees, respectively, from the center of subplot 1. The center of the microplot is offset 90 degrees and 12.0 feet horizontal (+/- 1 foot tolerance for initial establishment) from each subplot center. If a subplot or microplot was installed incorrectly at the previous cycle, remeasure the subplot or microplot in its present location, make a notation in the plot record, and contact a field supervisor. *[Preceding paragraph paraphrased from Section 0.1 PLOT SETUP.]*

NRS Note: A subplot with forest land may be difficult to occupy for accurate tree data measurements due to inaccessibility of the subplot center (e.g., seasonal high water, busy road way, etc.). In the case of water, some inaccessibility can be minimized by accessing a plot during low tide, the dry season, or after winter freezing. Crews should do their best to safely occupy the subplot center. If necessary, a crew should return to a plot with additional gear so a subplot can be safely occupied. If the condition limiting access is temporary, crews should return to plot when site can be accessed safely. However, if a subplot cannot be done safely, the entire subplot should be classified as CONDITION CLASS STATUS = 5 and NONSAMPLED REASON = 03. Crews should also be aware that each state has a sample of plots that are completed during the summer window. This sample includes P3 plots, plots selected for invasive plants tally, and plots selected for the Pennsylvania Regeneration study. For these plots, do your best to occupy the plot and collect the data. Anytime a subplot cannot be occupied, a PLOT NOTE is required explaining conditions that prevented occupancy.

NRS Note: Subplots and microplots are monumented by either a metal pin or wooden dowel. Only a single marker is required at the subplot or microplot centers. The current crew should replace a marker if it has deteriorated. The replaced marker should be removed from the plot site. If the old marker is not found, write a PLOT NOTE indicating that a new marker has been set by triangulating from existing tally trees or reference trees. Crews should be careful that edge trees (subplot or microplot) that were correctly determined to be “out or in” by the previous crew are not now “in or out” when replacing a marker.

3.1 SUBPLOT NUMBER

Record the code corresponding to the number of the subplot.

NRS PDR Note: This variable is determined by the subplot selection in the *MIDAS PDR Application*.

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 **[STAT]**

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, seedlings, or invasives. 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 **[REAS]**

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) and it is impossible for the crew to return to complete the data collection. 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

NRS Note: Nonforest inventories are not conducted in our region, i.e. NONFOREST SAMPLING STATUS = 1.

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

NRS Note: Nonforest inventories are not conducted in our region, i.e. NONFOREST SAMPLING STATUS = 1.

For entire nonforest subplots that cannot 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 **[SCEN]**

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 **[MCEN]**

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 **[SLOP]**

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 center 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.

NRS Note: If subplot is partially forested, the slope is determined across the entire subplot—record slope even if <5%.

When collected: All subplots with at least one accessible forest land condition present on sub plot (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 **[ASP]**

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

- If aspect changes gradually across the subplot, record an average aspect.
- If aspect changes across the subplot but the aspect is predominately of one direction, code the predominate direction rather than the average.
- If the subplot center falls directly 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.

NRS Note: If SUBPLOT SLOPE is less than 5 percent, Subplot Aspect = 000. If subplot is partially forested, the aspect is determined across the entire subplot.

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 **[SWD]**

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.

NRS Note: If snow amounts are excessive on the microplot, the seedling tally as described in 6.0 SEEDLING DATA is restricted to seedlings visible above the snow. Do not excavate snow from the microplot to achieve a better measurement. This practice may compromise the integrity of the microplot by exposing seedlings and other vegetation to animal browsing; and by exposing seedlings to extreme temperatures that may lead to mortality.

NRS Note: Disregard permanent bodies of water such as streams. For snow and flooding that covers the entire subplot, use an average depth across the entire subplot. This variable is used to filter out unusual situations that compromise the data, like deep snow or flooding that affects the accuracy of various SEEDLING DATA and TREE DATA measurements.

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

3.10.1N-ME CROWN CLOSURE **[MECC]**

See Regional Appendix D for state and/or species specific variable data collection procedures and codes.

3.11 SUBPLOT/MACROPLOT CONDITION LIST **[CLST]**

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.

NRS Note: If PLOT STATUS = 1, then delineation is required between CONDITION CLASS STATUSES 1, 2, 3, 4 and/or 5. If PLOT STATUS = 2 or 3, then no further delineation is required. The first nonforest/nonsampled land use delineated on a subplot in numeric order is recorded for the entire plot. Additional nonforest/nonsampled land uses are not delineated. Use the pre-printed plot diagram to illustrate the other nonforest land uses not recorded. The plot diagram is useful for plot relocation during the next cycle.

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.

NRS Note: Not all boundaries are straight lines. The straight lines determined by the boundary referencing procedure should not be used to assign a tree's condition number.

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.

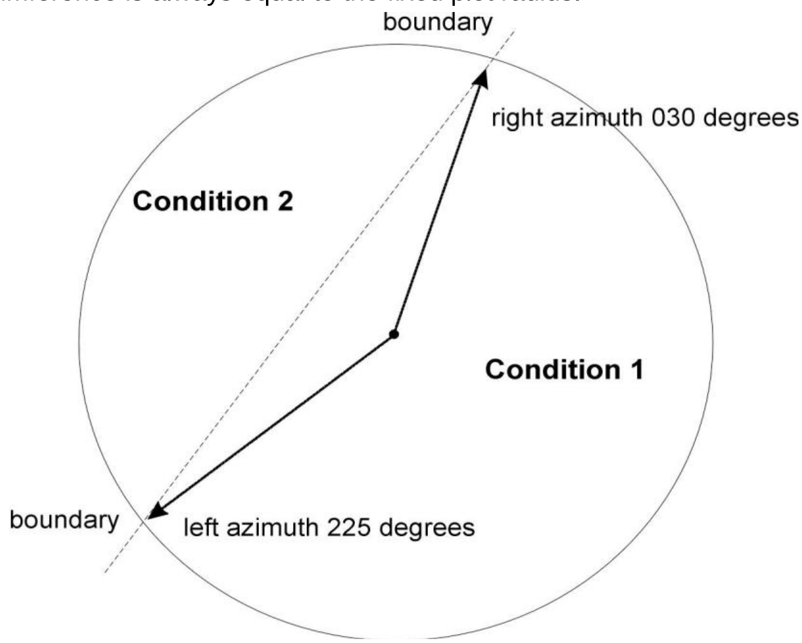


Figure 18. How to measure a straight boundary on a microplot, subplot, or macroplot.

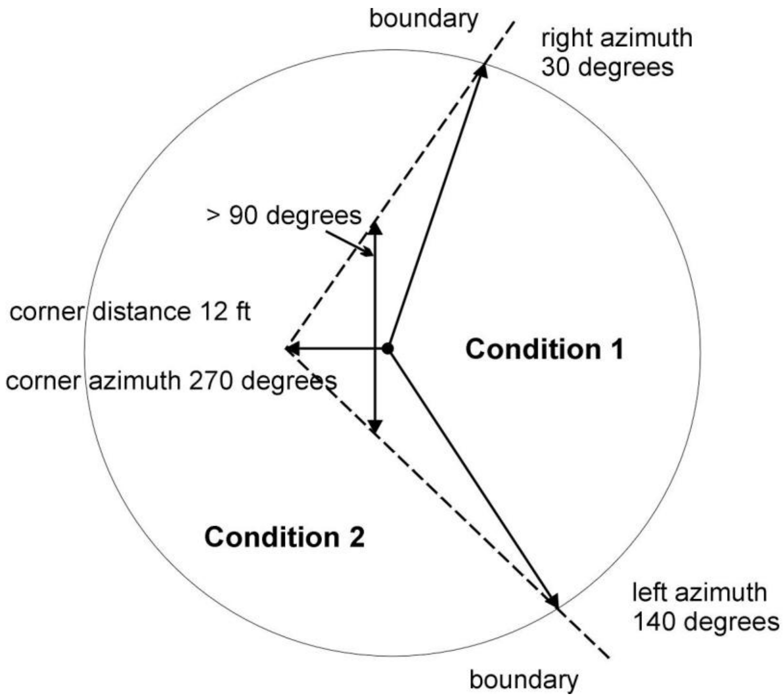


Figure 19. How to measure a boundary with a corner on a subplot or macroplot.

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 current 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. (See NRS Note for BOUNDARY CHANGE.)

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.

NRS PDR Note: This variable is determined by the subplot selection in the PDR program.

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 **[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 **[CHNG]**

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

NRS Note: On remeasurement plots, if the current azimuths are within 10 degrees of the previous azimuths and no physical change has taken place, record the previous crew's boundary data. BOUNDARY CHANGE = 0.

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 **[CCON]**

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 **[LAZM]**

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 **[CAZM]**

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 **[CDIS]**

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

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

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

4.2.8 RIGHT AZIMUTH **[RAZM]**

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

4.2.9N PERCENT AREA **[%ARE]**

The percent area represents the portion of the plot in the CONTRASTING CONDITION.

NRS PDR Note: This variable is a calculated by the *MIDAS PDR Application*.

When collected: All boundaries
Field width: 3 digits
Tolerance: N/A
MQO: N/A
Values: 001 to 100

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. Saplings are often generically termed trees within the national and regional variable text. Refer to "When Collected" to see if a variable pertains to a sapling as well as tree.

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

NRS Note: DRC procedures are applied only on Rocky Mountain Juniper (*Juniperis scopulorum*) – species code 0066 – in the states of KS, NE, ND and SD. This species is generally found in the western half of these states.

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. If the stem is broken and still attached below DBH, the stem is tallied as a live tree. The severity of the break (i.e., more or less than 50% attached) on a live stem is not considered. Therefore as long as the stem is attached and the tree is live at DBH, it is tallied. See Figure 16.1N.

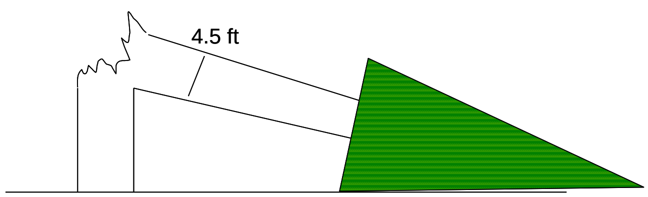


Figure 16.1N. Example of a live tree with a broken stem below 4.5 feet.

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.

NRS Note: Dead trees where the bole is separated greater than 50 percent at 4.5 feet but maintains a DBH of 5.0 inches or greater will be measured as a Standing Dead tree. ACTUAL LENGTH will be coded as 5 feet in this situation.

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.

NRS Note: Trees that have been cut above DBH qualify as removals. This includes trees with high stumps and trees that have been cut with wood remaining at DBH (i.e., barber-chair). High stumps are usually a result of winter harvesting due to excessive snow total amounts. In addition, high stumps on trees with natural butt-swell (where it is normal to cut above 4.5 ft.) do not qualify as standing dead trees.

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 in the PDR. The remaining tree data line receives PRESENT TREE STATUS = 1 or 2 with DIAMETER CHECK = 2, and a TREE NOTE in the PDR.

- 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 in the PDR. The second stem would get PRESENT TREE STATUS = 1 or 2, RECONCILE 3 or 4, and a TREE NOTE in the PDR.

NRS Note: <u>If a subplot was installed incorrectly at the previous visit, the current crew should remeasure the subplot in its present location</u>. In cases where individual forested subplots are lost (cannot be relocated and is not a land use change), apply the following procedures:

- Assign PRESENT TREE STATUS = 0 and RECONCILE = 7 to all downloaded trees (i.e., incorrectly tallied at the previous survey)

- Assign PRESENT TREE STATUS = 1 or 2 AND RECONCILE codes 3 or 4 (i.e., missed live or missed dead) to all trees on the new installed subplot with the next new TREE RECORD NUMBER for that subplot.

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.

5.1 SUBPLOT NUMBER

Record the subplot number where the tree occurs.

NRS PDR Note: This variable is determined by the subplot selection in the *MIDAS PDR Application*.

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 **[TR#]**

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.

NRS PDR Note: A new TREE RECORD NUMBER is assigned in the field. The next available tree number is on the printed plot sheets and is also an option on the *MIDAS PDR Application*. Click "**Ctrl+C**" on the PDR for the Next Tree Number. If a remeasurement tree is missing from the electronic data file, enter the data using the assigned tree number from the previous cycle's printed tree data and enter all associated previous history data.

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 **[CON#]**

Record the CONDITION CLASS NUMBER in which each tree is located. Often, a referenced boundary is approximate and may or may not represent the actual "on the ground" boundary, and trees selected for tally are assigned to the actual condition in which they lie regardless of the recorded approximate boundary (fig. 20).

NRS Note: Trees and saplings are tallied only on accessible forest land. Trees and saplings that were previously measured on forest land and now fall in a nonforest condition require minimal tree data collection. See 5.31N FOREST TO NONFOREST VARIABLES for a listing of these variables.

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

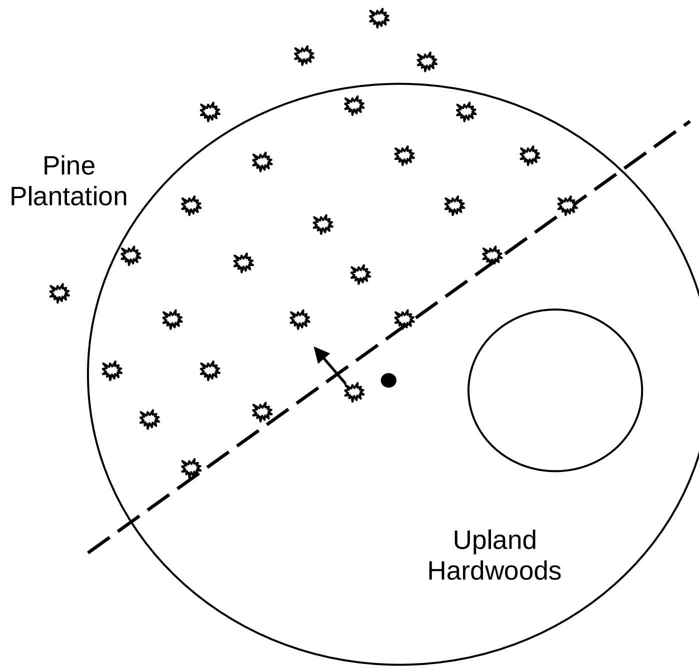


Figure 20. Ragged CONDITION CLASS boundary and tree condition class designation.

5.4 AZIMUTH **[AZM]**

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 **[DIST]**

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

The following are additional regional instructions to determine HORIZONTAL DISTANCE for trees that lean, are windthrown, or on steep terrain.

- A leaning tree is determined to be "in" or "out" of a plot radius by measuring the horizontal distance from plot center to the center of the tree at the base. The direction that the tree leans is of no consequence.

- For a LIVE down and windthrown tree, measure the horizontal distance to the spot where the center of the tree would have been if the tree was still standing (i.e., measure the distance to the center of the stump, or ground cavity). This guideline applies to New plots as well as Remeasurement plots. See Figure 20.1N below.

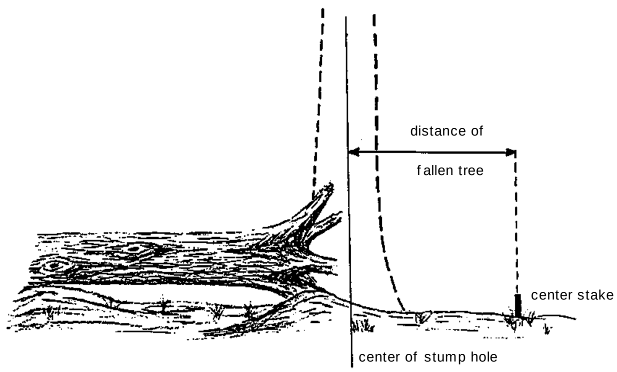


Figure 20.1N. Down and Windthrown Tree.

- When direct horizontal distance cannot be accurately measured due to steep terrain, slope distance and percent slope (both measured with a clinometer parallel to the ground) should be used to calculate the horizontal distance. See below formula and Figure 17.1N.

$$\frac{\text{measure slope distance to tree}}{\text{100 ft slope distance}} = \frac{\text{horizontal distance to tree}}{\text{100 ft horizontal distance}}$$

For example, a tree has a slope distance of 25.9 ft and the slope is 48 %. Using the Slope Correction table in the Regional Appendix E, you find that the correction for 100 ft with 48 % slope is 10.9 ft.

All that's left is to solve the equation:

$$\frac{\text{25.9 ft}}{\text{110.9 ft}} = \frac{\text{horizontal distance to tree}}{\text{100 ft}}$$

Solve for the horizontal distance, HD = 23.4 ft.

NRS PDR Note: If the *MIDAS PDR Application* is available, there is a function utility that allows you to determine horizontal distance. For this utility enter the measured slope distance and the percent slope and the utility calculates a horizontal distance.

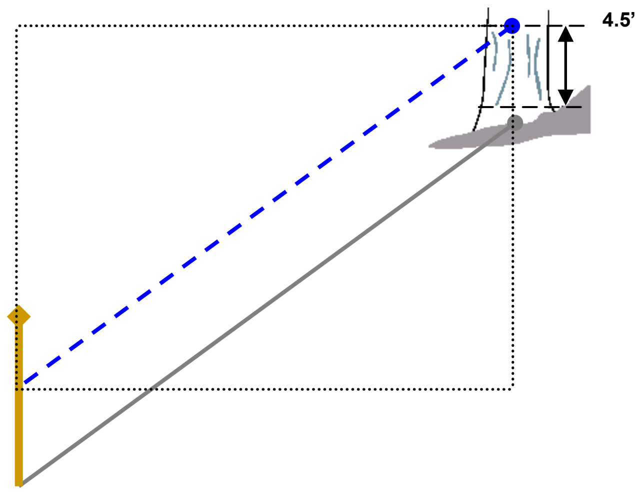


Figure 17.1N: A slope distance (dashed line) is measured parallel to the ground from the subplot center to the center of the tree and percent slope is measured along this dashed line (slope distance).

There is an alternative method to measure the slope distance and percent slope as shown in Figure 17.2N. Either measurement method will yield a horizontal distance when applied to the formula on the previous page or entered into the horizontal distance utility in the *MIDAS PDR Application*.

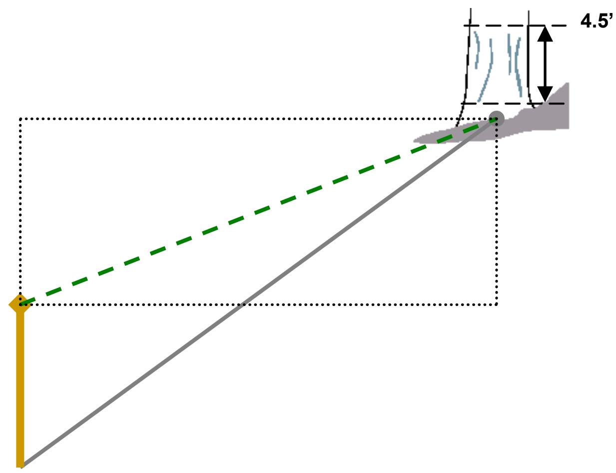


Figure 17.2N: A slope distance (dashed line) is measured from the subplot center to the center of the tree and percent slope is measured along the dashed line (slope distance.)

NRS Note: If a previous tree is located on the "outer" edge of a subplot (i.e., 23.8 to 24.2 ft to the pith of the tree at the base), then apply the following rules. If the current crew determines a previously tallied tree is now at ≤ 24.2 ft, the tree will remain IN. Similarly if the current crew determines that a previously non-tallied tree is ≥ 23.8 ft, the tree will remain OUT unless it is considered ingrowth. This also applies to saplings on the microplot's "outer" ring (i.e., 6.6 to 7.0 ft to the pith of the tree at the base). On the microplot, a previously tallied sapling is now at ≤ 7.0 ft, the sapling will remain IN. If a previously non-tallied sapling is at ≥ 6.6 ft, the sapling will remain OUT unless it is considered ingrowth. This allowance is due to the difficulty of determining pith location and other factors like slope and subplot and/or microplot center relocation.

When the old pin or dowel is not found, the current crew should make sure that all "edge" trees or saplings that were in or out on the previous occasion, are still in or out unless ingrowth.

Edges trees that are just off the subplot or microplot may be marked with a small "X" and with a small dab of paint at the base to indicate where pith center was determined. This practice will assist the next crew in remeasurement.

NRS PDR Note: Change the previous recorded distance if it is does not meet the indicated regional tolerance for trees. Example, if the previous distance was recorded as 15.2 and the current distance is now 16.0, the previous value is satisfactory. There is no need to change this value unless the previous distance causes current on the ground confusion like trees located in a clump. In these situations it makes sense to change this distance even if the previous distance is within tolerance.

NRS Note: Borderline trees that either fall just outside the 24.0 ft or 6.8 ft circle or are just under 5.0 inches or 1.0 inches require some type of indication that they should not be considered missed. To ensure these trees are handled properly by a QA crew or the next field crew, either make a mark on the tree or place a Note on the plotsheet indicating the tree is out or too small. The mark could include but is not limited to a scribe mark on thick bark trees or a line from a permanent marker.

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 from 00.1 to 23.0 ft
Subplot: +/- 0.2 ft from 23.1 to 24.0 ft
Subplot woodland species: +/- 2.0 ft
MQO: At least 90% of the time
Values: Microplot: 00.1 to 06.8
Subplot: 00.1 to 24.0

5.6 PREVIOUS TREE STATUS **[PAST]**

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 **[TRST]**
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.

NRS Note: A remeasured tree that is now in a "nonforest" condition is assigned the appropriate PRESENT TREE STATUS. For example, a tree that was previously live in accessible forest land and is still present and live in a residential area is coded as 1. If the tree has died (includes trees that have been removed and not utilized), it is coded as 2. If the tree has been removed and utilized, it is coded as 3. If the PRESENT TREE STATUS cannot be determined for a tree now in a "nonforest" condition (i.e., crew is unable to occupy the subplot), apply code 2 or 3. When applying code 2 or 3, apply known local utilization practices or best professional judgment for a tree that is now located in a nonforest condition.

NRS Note: When occupying accessible forest land, a remeasured tree that has a temporary hazardous situation (e.g., hornet's nest, seasonal high water, etc.) isolating the tree on the subplot or microplot, **should not** be given a PRESENT TREE STATUS = 0. These trees should be given PRESENT TREE STATUS = 1 or 2 and the crew is allowed to estimate the measured variables. When estimating measured variables, view similar trees on plot and be conservative. For a new tree, these same rules apply. A tree that occupies a permanent hazardous situation requires that the subplot area be delineated as nonsampled (CONDITION CLASS STATUS 5).

NRS Note: If the current CONDITION of previous tally trees converts from forest to nonforest between cycles, reference "**Condition Change from Forest to Nonforest**" in Regional Appendix C to determine required Tree and Sapling variables.

When Collected: All new live tally trees ≥ 1.0 in DBH/DRC
All new standing 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, or is not tallied because of inaccessibility (i.e., hazardous or denied). 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 **[RECO]**

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

When Collected: On SAMPLE KIND = 2; all new live tally trees ≥ 1.0 in DBH/DRC (PRESENT TREE STATUS = 1 and no PREVIOUS TREE STATUS), all new standing dead tally trees ≥ 5.0 in (PRESENT TREE STATUS = 2 and no PREVIOUS TREE STATUS), all previously tallied trees when 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 (PRESENT TREE STATUS = 1 or 2) 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 (i.e., grew from seedling to pole size between inventory cycles). Code is valid on SK2. Extremely rare for NRS.

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 (PRESENT TREE STATUS = 0) that no longer qualify as tally:

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

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

7 Cruiser error – erroneously tallied at previous inventory.

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

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

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

5.7.2 STANDING DEAD **[DEAD]**

Record the code that describes whether or not a tree qualifies as standing dead. To qualify as a standing dead tally tree, dead trees must be at least 5.0 inches in diameter, have a bole which has an unbroken ACTUAL LENGTH of at least 4.5 feet, and lean less than 45 degrees from vertical as measured from the base of the tree to 4.5 feet. For standing dead trees that are curved or bent, apply the same rules (i.e., from the base of the tree to 4.5 feet.) See figures 20-23 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 at 4.5 feet.

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.

NRS Note: Dead trees where the bole is separated greater than 50 percent at 4.5 feet but maintains a DBH of 5.0 inches or greater will be measured as a Standing Dead tree. ACTUAL LENGTH will be coded as 5 feet in this situation.

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.

NRS Note: Dead standing remeasurement trees that have dropped below 5.0 inches due to loss of bark will be given a TREE STATUS code of ‘2’ and a STANDING DEAD code of ‘0’. These trees no longer qualify as a STANDING DEAD but they still need to be accounted for in the sample. They **would not receive** a TREE STATUS code of ‘0’.

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 (includes a previously tallied tree that is still standing but with a current diameter < 5.0 in DBH)
1	Yes – tree does qualify as standing dead.

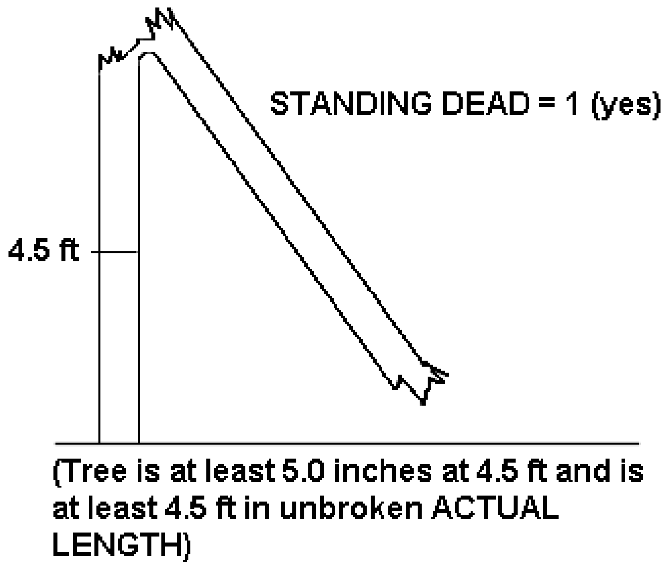


Figure 21. Example of an unbroken bole to 4.5 feet.

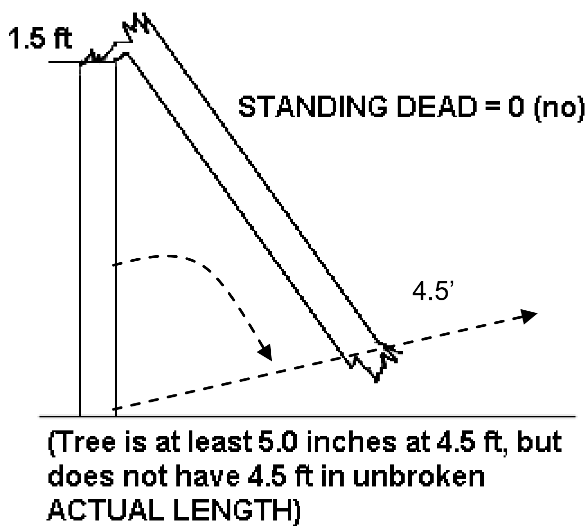


Figure 22+N. Example of an unbroken length of < 1.5 feet.

NRS Note: The break at 1.5 ft is at least 50% attached. The lean angle is determined at 4.5 ft.

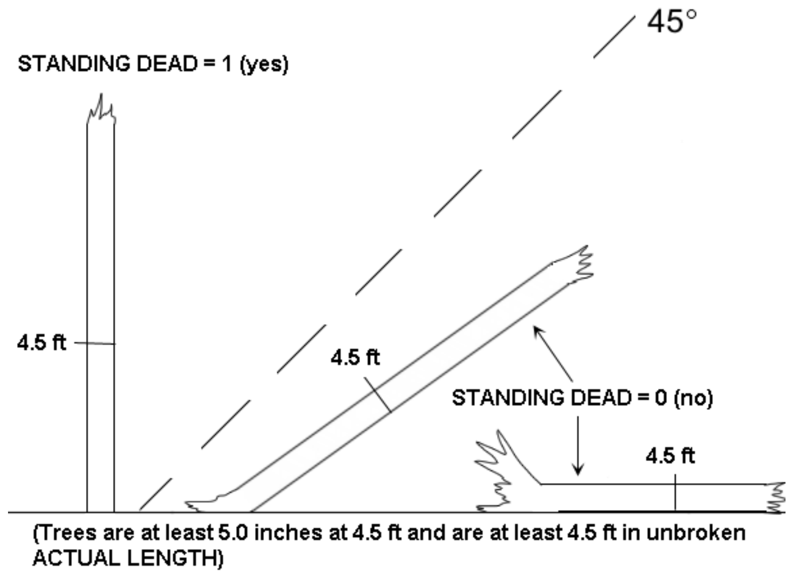
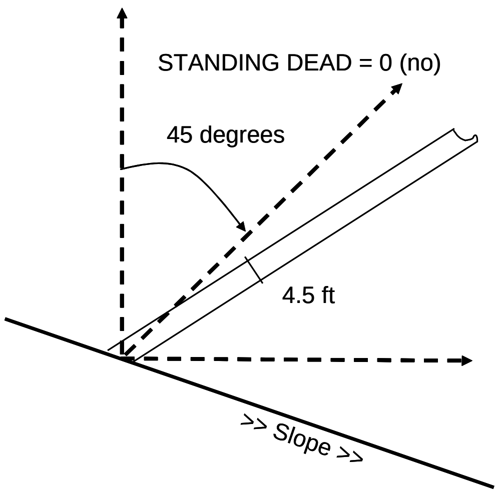
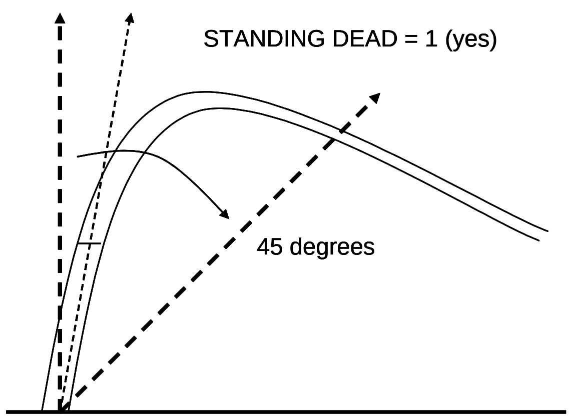


Figure 23. Other examples of dead trees.



Tree is at least 5.0 inches at 4.5 ft and is at least 4.5 ft in unbroken ACTUAL LENGTH, but the lean angle from vertical is more than 45 degrees.

Figure 20.1N. Example of dead tree on slope.



Tree is at least 5.0 inches at 4.5 ft and is at least 4.5 ft in unbroken ACTUAL LENGTH, and the lean angle from vertical is less than 45 degrees.

Figure 20.2N. Example of dead bent or curved tree.

5.7.3 MORTALITY (CORE OPTIONAL)

NRS Note: This variable is not collected in our region.

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 **[SPP]**

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's 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 in the PDR 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 genus 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 (East includes NRS and SRS and West includes PNW and IW) 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."

NRS Note: All serviceberry (*Amelanchier* spp.) and hawthorn (*Crategegus* spp.) are tallied. These two species can be coded using the generic genus code (0356 and 0500), if the species cannot be determined. If a hybrid species is found, naturally or planted, code the species with the most dominant characteristic from Appendix 3. If neither of the hybrid species are listed, then assign code 0999 and write a tree NOTE in the PDR.

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.

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) or thin barked trees. Do not penetrate the cambium when using a bark scribe. A scribe that penetrates the cambium has been found to cause damage and swelling that affects not only the health of tree but compromises growth calculations. Any tree that has been scribed in the past, do not scribe again. Apply paint to the mark created by the scribe.

The diameter mark is located approximately one inch below where the diameter is taken and it faces the subplot center or microplot center. If using a bark scribe or paint marker, the mark should be approximately two inches long or as appropriate for a sapling. Check for irregularities before making diameter marks (see “Special DBH Situations” rule 4).

The use of scribes and paint are prohibited on plots located in Wilderness areas on National Forests. Tally trees will not be painted or scribed. **Mark each tally tree 5.0" DBH and larger with only a nail at ground level** either facing subplot center or on the uphill side of the tree if there is a slope. If the sample tree is in view of a known path or trail, place the nail away from the path or trail and make a PLOT NOTE in the PDR. **A reference tree to the subplot center utilizes both a nail and tag.** If only saplings are on the subplot, mark a couple of them with nails at ground level and note which are marked in the PLOT NOTES in the PDR. **Nails should not be used on thin barked trees.** If diameter is not taken at DBH, the LENGTH TO DIAMETER MEASUREMENT POINT is recorded. Cutting vines and moss will not be done. In cases where vines or moss preclude the use of diameter tapes for estimation of diameter, calipers or other estimation procedures may be used. [INTRA-AGENCY AGREEMENT 05-SU-FIA01]

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.

NRS Note: If a remeasurment tree with a DBH measured above 4.5 feet is severed below the previously established DBH, the tree is no longer a ‘Tally tree’ regardless whether the tree maintains 5.0/1.0 inches at or above 4.5 feet.

The following are additional regional instructions on how to establish the initial DBH location and when to move a remeasurement location. Remember we are looking for ‘**Growth Over Time**’, so we want DBH initially placed in the best possible location and moved only if a gross deformity has formed or if it is no longer physically possible to collect DBH in the same location as the previous crew.

- For new measurement trees, initially attempt to measure DBH at 4.5 ft. If there is a gross deformity at that location, begin to move up the bole for a suitable location that will remain normal over time and to which an average-height crewmember can access. If there isn’t a suitable location above, then move below 4.5 for a suitable location. If that fails as well, last resort is to estimate DBH at a location that will best represent the tree volume.

- For remeasurement trees, initially attempt to measure DBH at the same location the previous crew measured. If a gross deformity is present at that location, once again start at 4.5 ft and move up and then down. If a new suitable location cannot be located, estimate the DBH at a location that will best represent the tree volume.

- For new measurement forked trees where multiple trees are recorded, attempt to measure each DBH at an accessible location above the crotch of the fork where the stem becomes normal and will remain normal over time. If that fails, last resort is to estimate DBH at a location that will best represent the tree volume.

- For remeasurement forked trees where multiple trees are recorded, attempt to measure each DBH at the same location the previous crew measured. If a gross deformity is present at that location or the crotch has fused, attempt to move the DBH up to an accessible location. Attempt to ensure a new location will be accessible in future cycles. If the location must be moved and it is predicted that the crotch will fuse within the next cycle, estimate the DBH at a location that will best represent the tree volume.

NRS Note: Borderline trees that either fall just outside the 24.0 ft or 6.8 ft circle or are just under 5.0 inches or 1.0 inches require some type of indication that they should not be considered missed. To ensure these trees are handled properly by a QA crew or the next field crew, either make a mark on the tree or place a Note on the plotsheet indicating the tree is out or too small. The mark could include but is not limited to a scribe mark on thick bark trees or a line from a permanent marker.

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 **[DBHO]**

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.

NRS Note: Record diameter height for all trees not measured at 4.5 feet, even if diameter was previously monumented.

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.

NRS Note: Evaluate the angle that the pith enters the main stem, not the general form extending from the tree, to determine if it is a fork or a branch.

NRS Note: A dead or missing stem is treated the same as a live stem on forked trees.

NRS Note: All forking rules apply to saplings, poles, and sawlog sized trees.

- 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.

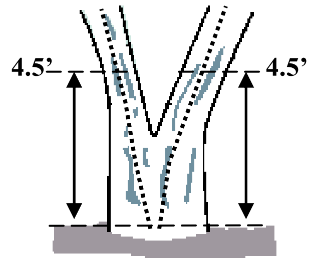


Figure 24. Forked below 1.0 ft.

- Trees forked between 1.0 foot and 4.5 feet. Trees forked between 1.0 foot and 4.5 feet are also counted as separate trees (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).

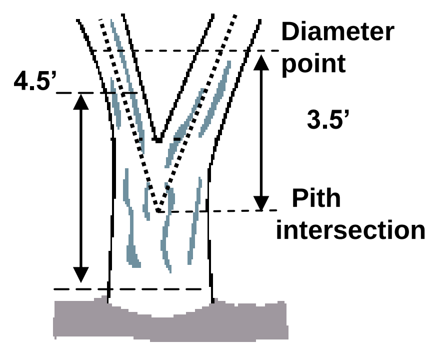


Figure 25. Forked between 1.0-4.5 ft.

  NRS Note: Diameter measurement due to a fork is to be taken 3.5 feet above the pith separation or at a "reasonable" reach for remeasurement. Place a diameter mark that can be consistently reached and remeasured by the next crew. If a diameter marked has already been placed, review the diameter procedures for "remeasurement trees" described in 5.9 - DIAMETER.

  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).

  NRS Note: Follow the same rules when measuring a forked sapling. If one of the stems is less than an inch but at least 1/3 the diameter of the larger stem, the diameter measurement point will remain at 3.5 feet above the pith separation. The stem less than an inch will not be tallied as a seedling in this situation.

- Trees forked at or above 4.5 feet. 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.

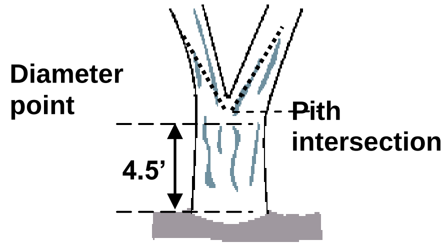


Figure 26. One tree.

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

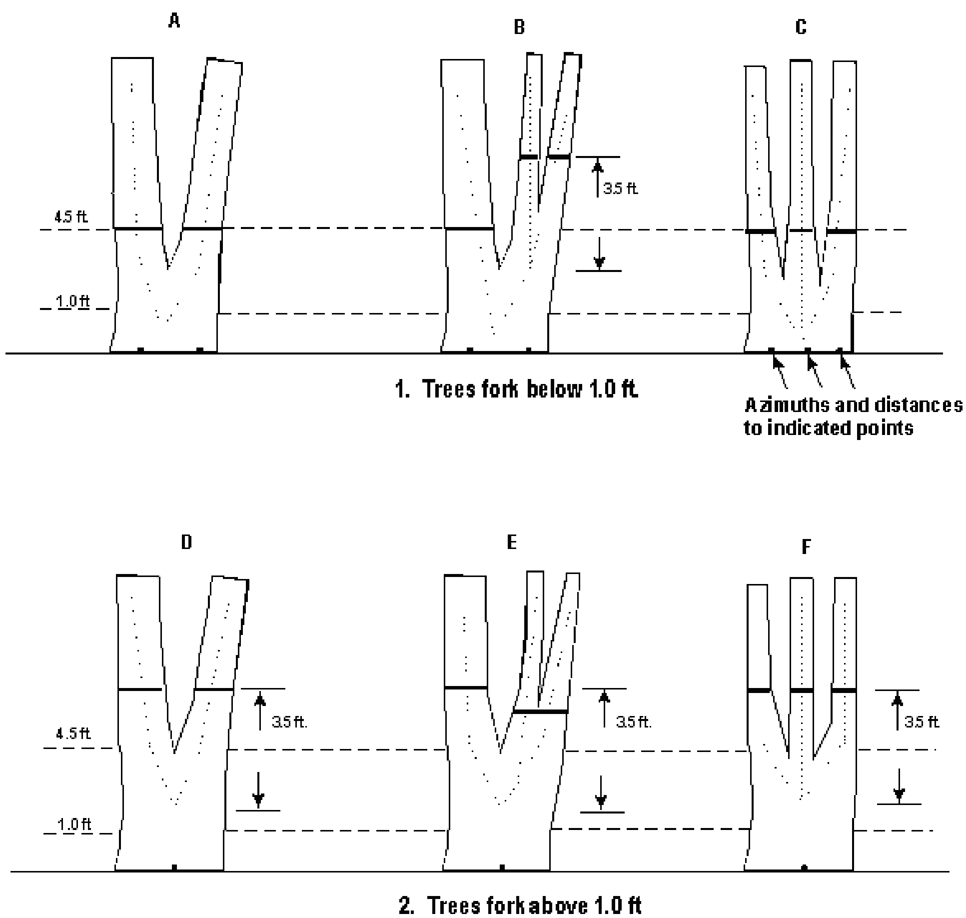


Figure 27. Summary of where to measure DBH, distance, and azimuth on forked trees.

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).

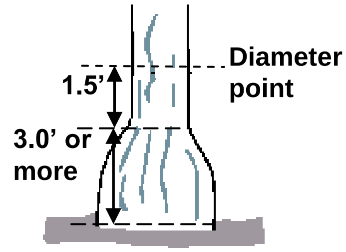


Figure 28. Bottleneck tree.

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.

   NRS Note: If the normal diameter point is out of reach due to the irregularity, it is acceptable to measure the diameter below 4.5 feet. Indicate the diameter height with variable 5.24 - LENGTH TO DIAMETER MEASUREMENT POINT.

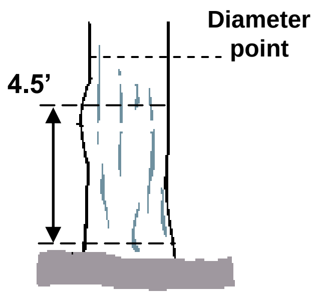


Figure 29. Tree with swelling.

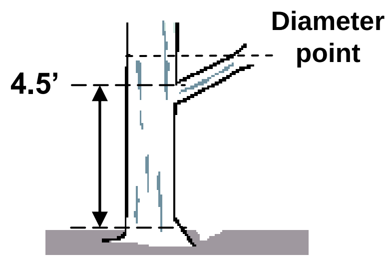


Figure 30. Tree with branch.

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).

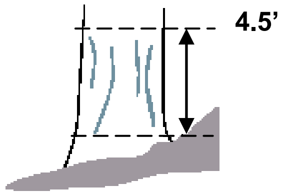


Figure 31. Tree on a slope.

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).

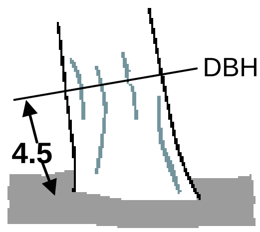


Figure 32. Leaning tree.

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 in the PDR.

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).

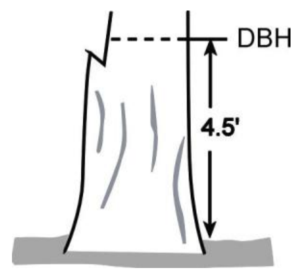


Figure 33. Tree with part of stem missing.

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

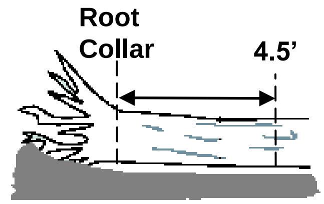


Figure 34. Tree on the ground.

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 general pith line 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+N).

- 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.

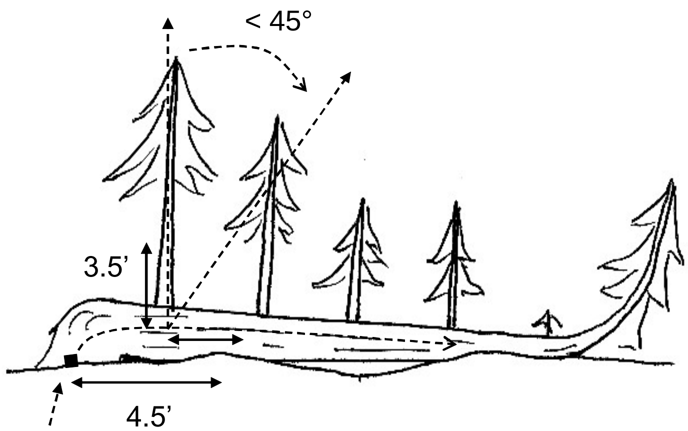


Figure 35+N. Down tree above duff. In this example, 2 stems are measured. The stem along the ground and 1st tree-like branch.

- 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 general pith line 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.

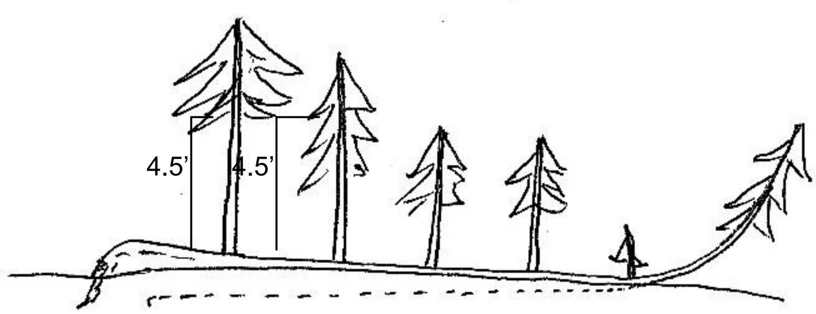


Figure 36. Down tree below duff.

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

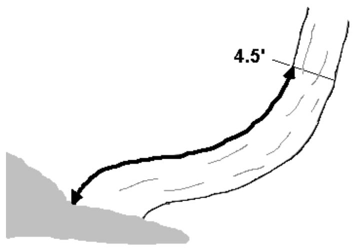


Figure 37. Tree with curved bole (pistol butt tree).

13. Tree growing on objects: When trees are growing on objects, such as rocks or logs, measure at 4.5 feet above the root crown rather than above the forest floor. (Figure 37.1N). [*Source: FSH2409.12-2000*] Trees that reside in water much of the year can also produce "prop-like" roots, measure diameter in a similar method at 4.5 feet above the root crown.

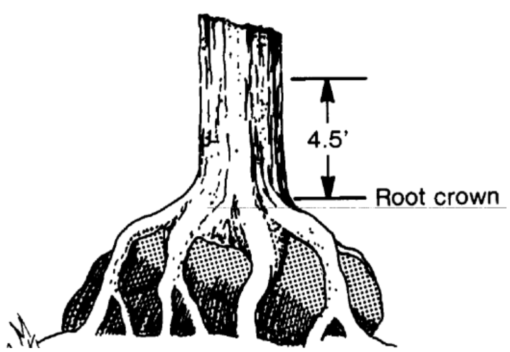


Figure 37.1N. Trees growing on objects (e.g., rocks, logs).

5.9.3 PREVIOUS DIAMETER AT ROOT COLLAR

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

NRS Note: The DRC procedure is applied only on Rocky Mountain Juniper (*Juniperis scopulorum*) – species code 0066 – in the states of KS, NE, ND and SD. This species is generally found in the western half of these states. DBH procedures described in section 5.9.2 are not applicable to species code 0066.

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).

NRS Note: If one measurement of DRC at the root collar can be accomplished, then take one measurement as shown in Figure 38, example 3. Mark the DRC measurement point. If growth habits and/or soil level make one measurement impossible as shown in Figure 38, example 6, then mark and measure the qualifying stems.

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:

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

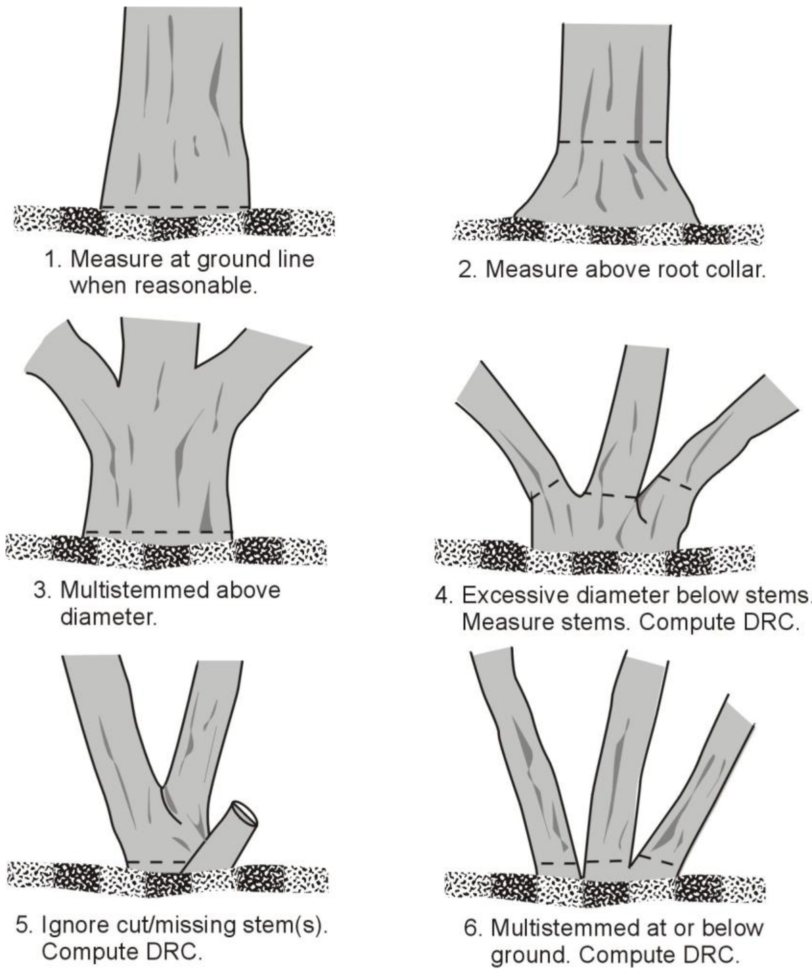


Figure 38. How to measure DRC in a variety of situations.

NRS PDR Note: When species code 0066 is entered, the *MIDAS PDR Application* will shade out DBH and require the activation of the DRC entry screen by clicking on CTRL+P. The DRC entry screen allows the entry of the next two variables – DRC STEM DIAMETER and DRC STEM STATUS. The utility allows the entry of multiple stems and upon completion of these entries; it calculates a value for 5.9 – DIAMETER.

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.

NRS Note: PAST NUMBER OF STEMS is a hidden variable in our region.

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.

NRS Note: CURRENT NUMBER OF STEMS is auto-tallied in the DRC Calculator Screen and will be auto-populated as a hidden variable in our region.

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 **[DCHE]**

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

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

Values:

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

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

5.12.1N TREE CLASS **[TCC]**

This code represents a classification of the overall quality of a tree that is ≥ 5.0 inches DBH. It classifies the quality of a live sawtimber tree based on the present condition. It also forecasts the potential quality of a live poletimber tree when it becomes sawtimber size. For standing dead trees, it will identify those trees that could be salvaged for wood fiber (i.e., chips) if a salvage operation was imminent.

Prior to assigning a tree class, it is necessary to determine sawlog length and the amount of board-foot cull present within the sawlog length. When evaluating the sawlog length for tree class, the sawlog length is measured between a 1 foot stump and a 9.0-in Top Diameter Outside Bark (DOB) for hardwoods or a 7.0-in Top DOB for softwoods. For trees that fork, only use one stem when determining sawlog length (i.e., follow the stem yielding the most merchantable volume). See % ROUGH BOARD-FOOT CULL and % ROTTEN BOARD-FOOT CULL in Regional Appendix D for the criterion that determines cull within the sawlog length.

When estimating the potential sawlog length for live poletimber size trees, apply the following “Two-inch Rule”. Take the current DBH minus two-inches on a poletimber size tree. This calculated diameter is used to determine the potential Top DOB of the future sawlog length when the tree becomes sawtimber-size. Once the potential Top DOB is determined, the tree must maintain this diameter for at least the length of a potential sawlog to receive a TREE CLASS 2, Growing Stock. For example, a tree with an 8.0-in DBH today, applies a 6.0-in Top DOB on today’s bole to project the potential sawlog length when the tree reaches sawtimber size. If 6.0-in is not maintained within the potential sawlog length then the tree is not eligible to receive a TREE CLASS of 2. (The “Two-inch Rule” assumes that a tree’s diameter increases uniformly along its bole.)

When estimating the potential of poletimber softwoods, branch diameters can be forecast in order to determine TREE CLASS. If multiple branches within the merchantable log/s are receiving direct sunlight and have the potential to exceed 2 inches, the poletimber sized tree can be give a TREE CLASS of ‘3’. Once the tree reaches sawlog size, forecasting is no longer an acceptable practice.

During the determination of TREE CLASS, Dead Tops within live trees will factor into the classification. The dead material is considered Cull so it will not contribute to the tree being classified as Growing Stock. Determination must still be made whether the Cull is predominantly Rough or Rotten. The TREE CLASS will be classified depending on the assessment of the total volume of the tree. All dead sections within the sawlog portion will be considered either rough or rotten cull.

When Collected: All trees ≥ 5.0 in DBH/DRC when PRESENT TREE STATUS = 1 or PRESENT TREE STATUS = 2 and STANDING DEAD = 1
Field width: 1 digit
Tolerance: No errors
MQO: At least 90% of the time
Values:

2 Growing Stock – A live sawtimber-size tree with one-third or more of the gross board-foot volume in the entire sawlog length meeting grade, soundness, and size requirements; or the potential to do so for poletimber-size trees. It must contain one merchantable 12-foot log or two non-contiguous merchantable 8-foot logs, now (sawtimber) or prospectively (poletimber).

3 Rough Cull – A live tree that does not contain at least one 12-foot sawlog or two non-contiguous 8-foot logs now (sawtimber) or prospectively (poletimber), primarily because of roughness or poor form within the sawlog length. Or sawtimber and prospectively poletimber with two-thirds or more of its gross board-foot volume that does not meet size, soundness, and grade requirements; and 50% or more of the assigned total board-foot cull within the sawlog length is rough cull.

4 Rotten Cull – A live tree that does not contain at least one 12-foot sawlog or two non-contiguous 8-foot logs now (sawtimber) or prospectively (poletimber) and/or do not meet grade specifications for percent sound primarily because of rot within the sawlog length. Or sawtimber and prospectively poletimber with two-thirds or more of its gross board-foot volume that does not meet size, soundness, and grade requirements; and 50% or more of the assigned total board-foot cull within the sawlog length is rotten cull.

5 Salvable Dead – A standing dead tree with at least one-third merchantable sound volume. ROTTEN/MISSING CUBIC-FOOT CULL does not exceed 67%. Note: ROUGH CUBIC-FOOT CULL is not a criterion for determining salvable dead.

6 Nonsalvable Dead – A standing dead tree that does not qualify as salvable.

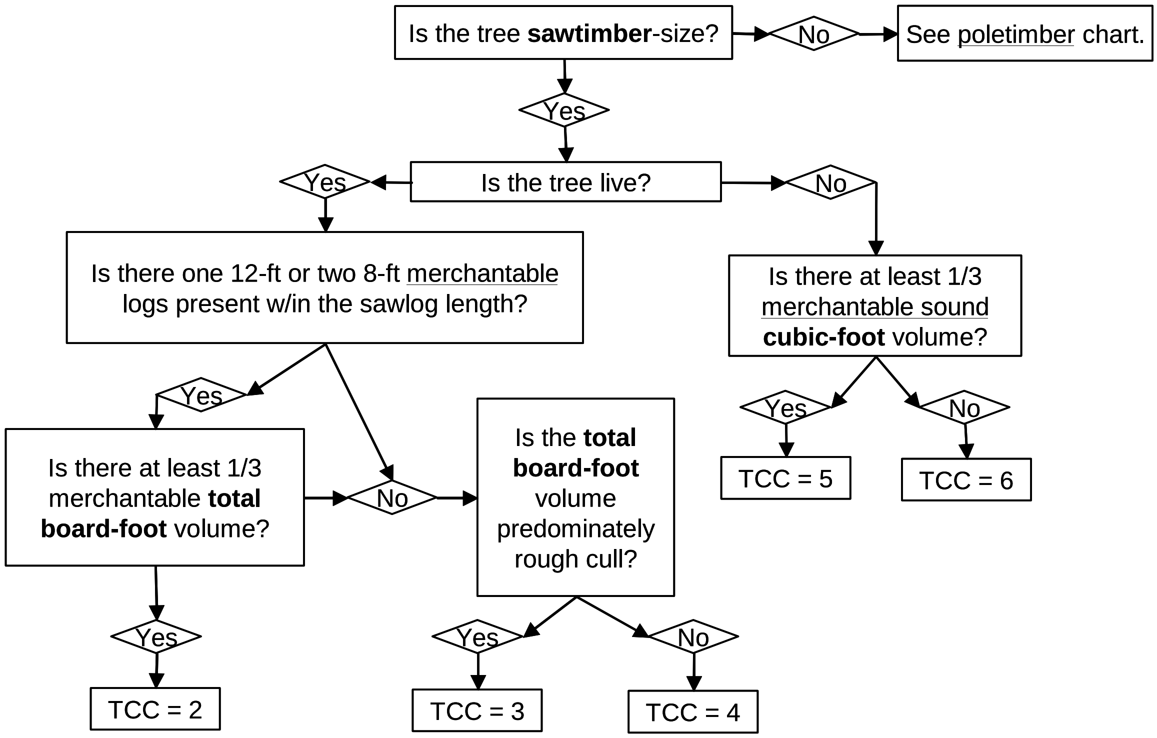


Figure 38.1N. TREE CLASS flowchart for sawtimber-size trees – $\geq$ 9.0-in for softwoods or $\geq$ 11.0-in DBH for hardwoods.

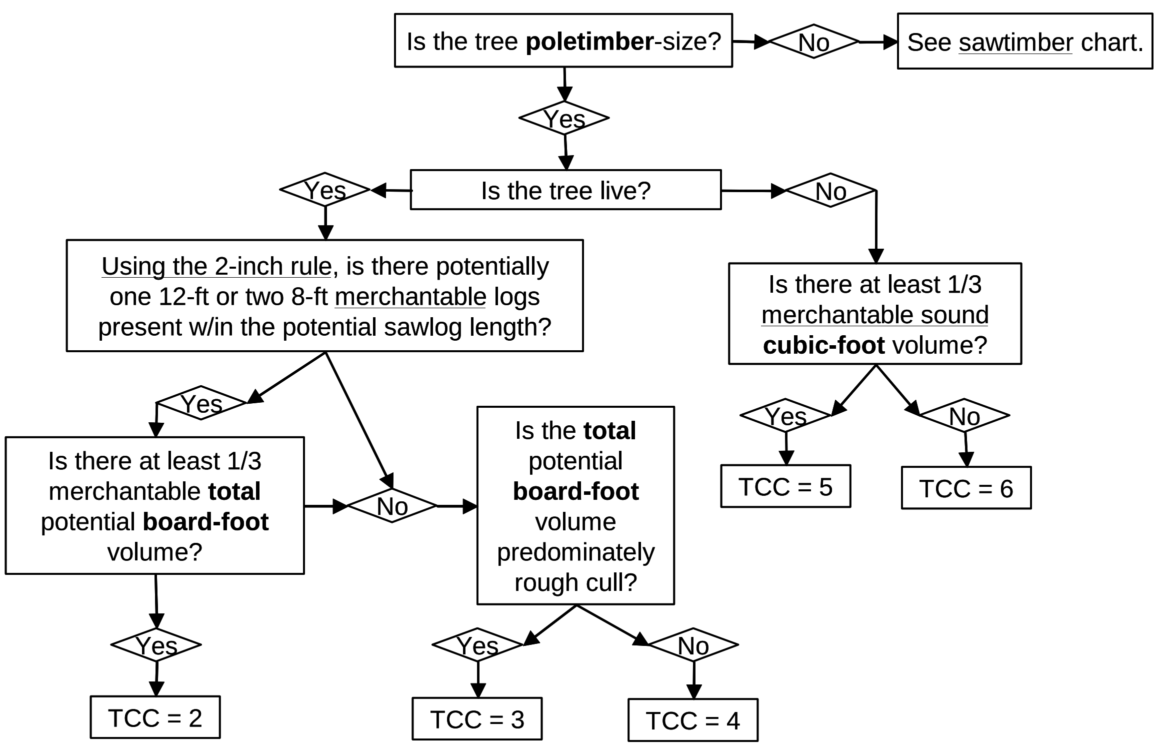


Figure 38.2N. TREE CLASS flowchart for poletimber-size trees – $\geq$ 5.0-in DBH all trees.

Step 1: When determining TREE CLASS, the entire sawlog length (1 foot stump to a 9.0-in Top DOB hardwoods or 7.0-in Top DOB softwoods) must be visually divided into 8 foot or longer log lengths. The length of 8 foot or longer logs is determined by the presence of “stoppers” within the entire sawlog length. The following is a list of “stoppers” to be applied:

- Fork – A fork must be at least 1/3 the diameter of the main stem and branch out from the main stem at 45 degrees or less where the pith enters the main stem. For trees that fork, only use one stem when determining the remaining sawlog length (i.e., follow the stem yielding the most merchantable volume). When one of the forks is dead, the live fork will provide the most merchantable volume.

  Evaluate the angle that the pith enters the main stem, not the general form extending from the tree, to determine if it is a fork or a branch.

  A dead or missing stem is treated the same as a live stem on forked trees.

- Excessive sweep or crook – To determine if the sweep or crook exceeds the maximum allowed; refer to the sweep or crook deduction tables in Regional Appendix E.

- Rot or missing wood – A cross-section that is 50% or more affected by rot or missing wood. All conks and fungal wedges are stoppers, except *Phellinus Tremulae* on aspen.

- Cankers – A canker that is at least 50% or more of the circumference at the point of occurrence. Gulls and Rust can be included in the Canker section when identifying Stoppers. Note: One face or side represents 40% of the circumference. A canker is measured at the widest distance between the outside of the canker swelling. (Do not confuse burles with cankers. Burles are not classified as a stopper.)

- Metal – All metal except aluminum research tags and nails.

  Note: “Rough stoppers” include forks, excessive sweep and crook as described above. “Rot stoppers” include rot/missing wood, cankers and metal as described above. Depending on the type of stopper, the board-foot cull associated below a stopper is either rough board-foot cull or rotten/missing board-foot cull.

Step 2: Assume that all live trees will reach sawtimber-size. Assume all poletimber-size trees will become sawtimber. Use the “two-inch rule” for poletimber-size trees to estimate the future Top DOB for either a hardwood or a softwood. Do not attempt to predict mortality. The goal of the tree classification system is basically a check of the straightness and soundness of the sawlog length or the potential sawlog length for poletimber-size trees. A small diameter poletimber-size tree should be allowed more leeway due to the possibilities of growing out of deformities. Noncommercial species should be treated the same as commercial species.

<u>Live Trees</u>

a. Start at a 1 ft stump and continue up the stem until the first stopper is encountered. Note: If the tree forks between 1 ft and 4.5 ft, start at the pith intersection (see Figure 22).

b. Measure the distance between the starting point and the stopper.

c. If the length is less than 8 ft, the entire length is either rough or rotten board-foot cull. If a rot stopper is encountered, the associated volume below the stopper is assessed as rotten/missing board-foot cull. If a rough stopper is encountered, the associated volume below the stopper is assessed as rough board-foot cull.

d. If the length is 8 ft or more, the 8 ft or longer length must meet minimum grading specification for that species. If grading specifications are not met, the portion of the 8 ft or longer length that does not meet grade is assessed as board-foot cull. E.g., 20 ft is measured between a starting point and a stopper. The 20 ft length can be divided into an 8 ft and 12 ft logs. The 12 ft log meets grade and is not culled, but the 8 foot log does not meet grade and is culled.

e. The first stopper becomes the next starting point. Again measure up the tree until the next stopper is encountered. Continue this process until a 9.0-in Top DOB for hardwoods or a 7.0-in Top DOB for softwoods is reached.

f. If one 12 ft or two noncontiguous 8 ft merchantable logs are not present, the tree is classified as either rough or rotten cull. If the majority of the total board-foot cull in the entire sawlog length is assessed as rough cull, TREE CLASS = 3. If the majority of total board-foot cull in the entire sawlog length is assessed as rotten/missing cull, TREE CLASS = 4.

g. If one 12 ft or two noncontiguous 8 ft merchantable logs are present, the entire sawlog length is next assessed for <u>total board-foot cull</u> including any rot or missing wood that is assessed to be less than 50% at the cross-section (i.e., sector cull). If the tree has one-third or more merchantable volume (i.e., 67% or less total board-foot cull), TREE CLASS = 2. If total board-foot cull is greater than 67%, TREE CLASS = 3 or 4.

<u>Standing Dead Trees</u>

a. If the tree is dead (sawtimber or poletimber), determine whether or not the ROTTEN/MISSING CUBIC-FOOT CULL in the entire bole length is greater than 67%. If yes, TREE CLASS = 6. If no, TREE CLASS = 5.

ROTT = 01 - 67%, TREE CLASS = 5.
ROTT = 68 - 99%, TREE CLASS = 6.

SEE TREE CLASS ILLUSTRATIONS IN REGIONAL APPENDIX F.

5.12.2N TREE GRADE **[TRGD]**

Record a tree grade for all sawtimber size trees classified as Growing Stock. To be classified as Growing Stock and receive a TREE GRADE, all rules in section 5.12.1N for Growing Stock must be met.

In order to receive a TREE GRADE 1, 2, 3 or 4 (when valid), at least a 12 foot grading section is required in the butt 16 feet for all species. **Trees meeting the definition of Growing Stock that do not have a merchantable grade in the butt 16 but do have a 12 ft or two 8 ft gradable sections somewhere in the tree will be assigned a TREE GRADE 5.**

When Collected: TREE CLASS = 2 when DBH ≥ 9.0 in for softwoods or ≥ 11.0 in DBH for hardwoods
Field width: 1 digit
Tolerance: No errors
MQO: At least 90% of the time
Values: See Regional Appendix E for complete grading specifications for each species group

<u>Hardwoods</u> – Use the specifications for Hardwood Tree Grades (1, 2 or 3) or the Tie and Timber Grade (4) for all hardwood trees. Trees meeting the definition of Growing Stock that do not have a merchantable grade in the butt 16 but do have a 12 foot or two 8 foot gradable sections somewhere in the tree will be assigned grade 5. Note: When determining the grade

of upper logs, 8-foot sawlogs need to meet all the minimum grading factors except for length for hardwood tree grades 3 or 4.

Eastern white pine – Use the Eastern White Pine Tree Grades (1, 2, 3 or 4) for eastern white pine only. Trees meeting the definition of Growing Stock that do not have a merchantable grade in the butt 16 but do have a 12 foot or two 8 foot gradable sections somewhere in the tree will be assigned grade 5. Note: When determining the grade of upper logs, 8-foot sawlogs need to meet all the minimum grading factors except for length for white pine tree grade 4.

Other pines – Use the Pine Tree Grades (1, 2 or 3) for all pines except eastern white pine. There is no grade 4 for the Pine Tree Grades. Trees meeting the definition of Growing Stock that do not have a merchantable grade in the butt 16 but do have a 12 foot or two 8 foot gradable sections somewhere in the tree will be assigned grade 5. Note: When determining the grade of upper logs, 8-foot sawlogs need to meet all the minimum grading factors except for length for pine tree grade 3.

Other softwoods– Use the Other Softwoods Tree Grade (1) for spruce, fir, hemlock, larch (tamarack), cedar and cypress. Trees meeting the definition of Growing Stock that do not have a merchantable grade in the butt 16 but do have a 12 foot or two 8 foot gradable sections somewhere in the tree will be assigned grade 5. Note: When determining the grade of upper logs, 8-foot sawlogs need to meet all the minimum grading factors except for length for other softwood grade 1.

A minimum of 12 feet gradable length within the butt 16 feet is required to meet minimum grading specs for Grades 1-4 (depending on available grades per species). The 12 feet gradable length can be located anywhere within the butt 16 feet as long as all four grading faces are contained in the same linear 12 feet that is sliding. To explain further, the 12 foot graded section can be slid up or down within the butt 16 feet to obtain the highest possible grade while continuing to maintain all grading faces within that sliding 12 foot grading section.

The grading section is determined by the position of "stoppers" as defined in TREE CLASS within the butt 16 feet. E.g., if a stopper is positioned at 9 feet, then a 12 foot grading section cannot be obtained within the butt 16 feet. These trees are potentially graded as 5 if they still meet the definition of Growing Stock and contain a merchantable 12 foot gradable length or two 8 foot gradable lengths somewhere in the sawlog section.

Any section containing a rot or metal stopper is unsound cull. Rot does not necessarily eliminate grades 1-4 unless it is positioned so it is impossible to get a grading section that meets the minimum merchantable tree grade associated with the species. Metal does not necessarily eliminate grades 1-4 unless the metal is positioned so it is impossible to obtain a 12 foot section free of metal in the 16 foot grading section.

Note: Aluminum DBH tags and nails that have been placed for research are ignored and are not treated as cull and does not affect grade.

5.13 % ROTTEN/MISSING CUBIC-FOOT CULL **[ROTT]**

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. ("Missing" is wood absent from a log or part of a log that otherwise would usually be regarded as naturally complete. It may be caused by advanced decay, fire, or the operation of a machine or tool. It also includes sections that contain metal other than aluminum research tags and nails.) 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.

NRS Note: Rotten and missing cubic-foot cull includes sections that contain rot or missing wood or as determined by sector cull. Estimate percent rotten cull volume by using the appropriate cubic-foot volume cull estimating aid tables for all species found in Regional Appendix E.

NRS Note: Do not include rotten material contained within dead tops in the percent ROTT estimate.

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 – any presence.
- 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 (except aluminum research nails and tags) – Cull at least a 1 foot cross-section above and below the metal at the point of occurrence.

NRS Note: Sounding of the tree can be used to help determine the percent ROTT when visual evidence of rotten material is present and sounding will not further damage the tree.

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 **[THGT]**

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 length 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.

NRS Note: TOTAL LENGTH for DRC species is recorded as the highest top of all the stems.

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 [ACTU]

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). Examples:

- **Live** tree with **live** broken top with **more than 50% detachment** from the tree but is minimally attached – do not record ACTUAL LENGTH. TOTAL LENGTH is taken through or past the break as are BOLE and SAWLOG LENGTHS.
- **Live** tree with **dead** broken top with **more than 50% detachment** from the tree – record ACTUAL LENGTH in addition to TOTAL LENGTH
- **Dead** tree with **dead** broken top with **more than 50% detachment** from the tree – Record an ACTUAL LENGTH to the break.
- **Dead** tree with **dead** broken top with **less than or equal to 50% detachment** from the tree – record ACTUAL LENGTH through or past the break as well as BOLE and SAWLOG LENGTHS.

If the break is along the stem length, the actual length terminates where there is 50% of the stem remaining. If the top is intact including dead tops on live trees, 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.

NRS Note: If a dead tree with a broken top has a remaining branch that is1/3 the diameter at the break and extends higher, measure ACTUAL LENGTH to the top of the branch.

NRS Note: Record ACTUAL LENGTH for DRC species if what would have been the highest top is now missing.

When Collected: Phase 2 CORE: All live and standing dead tally trees (with broken or missing tops) $\geq$ 5.0 in DBH/DRC
Phase 2 CORE OPTIONAL: All live tally trees (with broken or missing tops) $\geq$1.0 in DBH/DRC and standing dead tally trees (with broken or missing tops) $\geq$ 5.0 in DBH/DRC
Phase 3 CORE: All live tally trees (with broken or missing tops) $\geq$1.0 in DBH/DRC and standing dead tally trees (with broken or missing tops) $\geq$5.0 in DBH/DRC
NRS-ME – See Regional Appendix D

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

5.16 LENGTH METHOD **[METH]**

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
NRS-ME – See Regional Appendix D

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, laser).

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 **[CCC]**

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.

NRS Note: Following is a systematic approach in determining Crown Class

- Determine the midpoint of the canopy of the neighboring trees
- Determine the height to the top of the crown
- Determine where the crown is receiving direct light
- Determine how crowded the crown is

Once the above items have been evaluated, a combination of each will be used to assign a Crown Class. (CCC 1 is addressed differently)

- If the top of the crown is below the midpoint, consider the amount of light received
    - If it receives no light, code CCC 5
    - If it receives some light but is very crowded, code CCC 4
- If the top of the crown reaches the midpoint, consider light received and how crowded it is
    - If it receives no light, code CCC 5
    - If it receives some light but is very crowded, code CCC 4
    - If it receives some light and is somewhat crowded by similar crowns, code CCC 3
- If the top of the crown extends above the general level
    - If it receives significant light, and is taller than the average trees, code CCC 2

The midpoint is defined as the neighboring trees' halfway point for their average Compacted Crown Ratio.

Crowded is defined as sunlight being partially blocked along with smaller and possibly misformed crowns.

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.

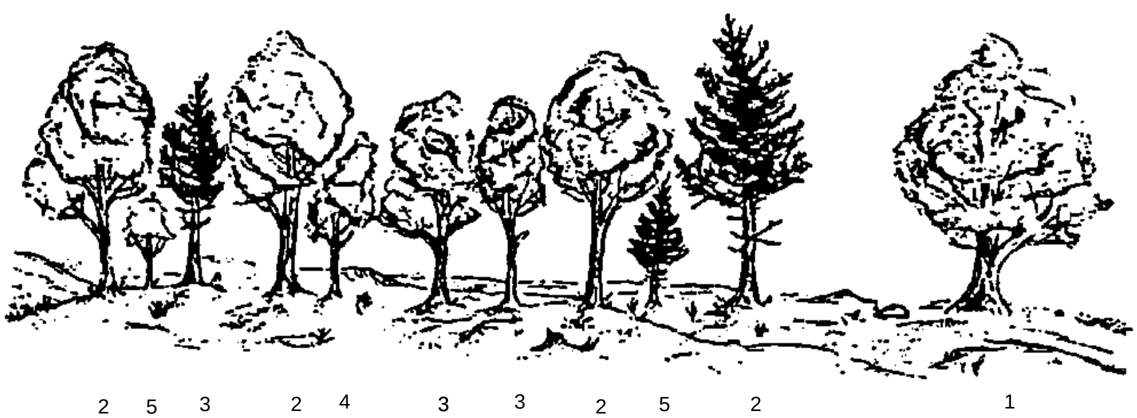


Figure 39. Examples of CROWN CLASS code definitions (numbers are the CROWN CLASS codes).

5.18 UNCOMPACTED LIVE CROWN RATIO (Phase 2 – CORE OPTIONAL, Phase 3 – CORE)
Variable not collected for PHASE 2 in the North. See VOLUME II: FIELD DATA COLLECTION PROCEDURES FOR PHASE 3 INDICATORS – 12.0 CROWNS: MEASUREMENTS AND SAMPLING

5.19 COMPACTED CROWN RATIO **[CRC]**
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 ACTUAL 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.

NRS Note: Epicormic branches do very little for the productivity of a tree. Therefore, they will account for very little when it comes to CRC. When calculating CRC for a tree that has nothing more than epicormic branches, picture a normal crown for the tree and then ocularly estimate the percentage the epicormic branches would fill. For these trees, CRC will likely be less than 10%.

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

Uncompacted: Compacted:

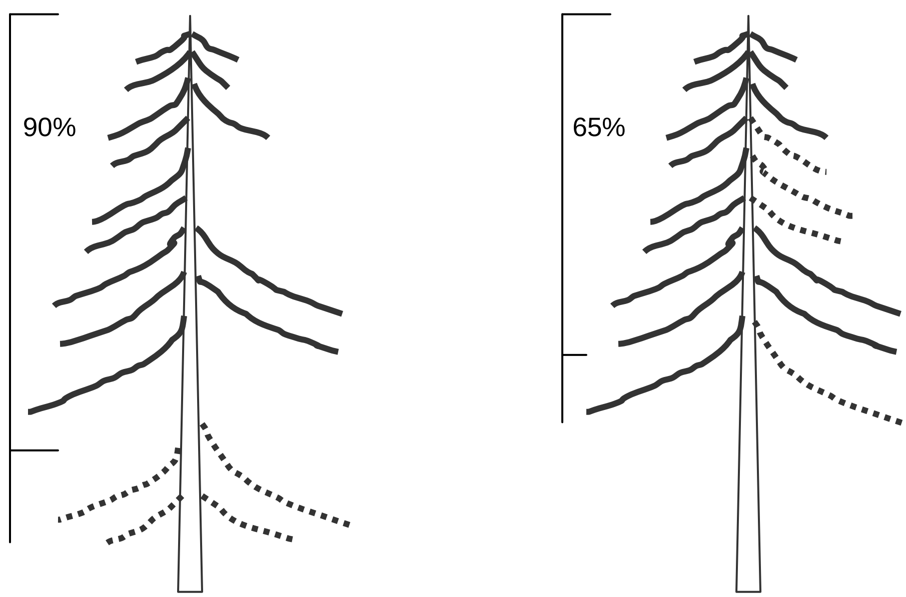


Figure 42a+N. Examples of and comparison between COMPACTED CROWN RATIO and UNCOMPACTED LIVE CROWN RATIO of open-crown conifers.

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

Uncompacted: Compacted:

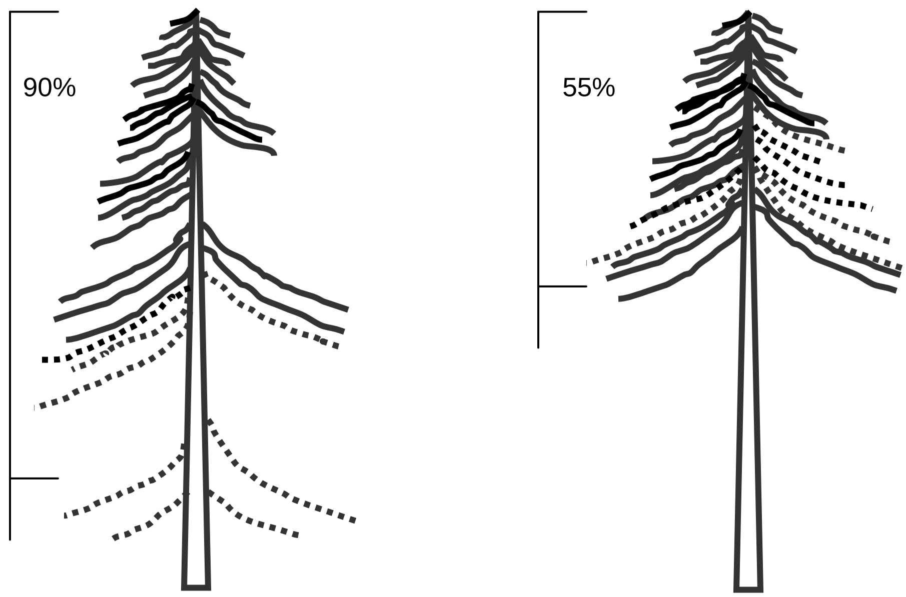


Figure 42b+N. Examples of and comparison between COMPACTED CROWN RATIO and UNCOMPACTED LIVE CROWN RATIO of dense-crown conifers.

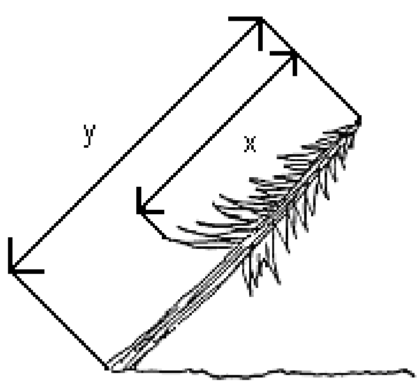


Figure 43. COMPACTED CROWN RATIO on a leaning tree. CROWN RATIO = (x/y)100.

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

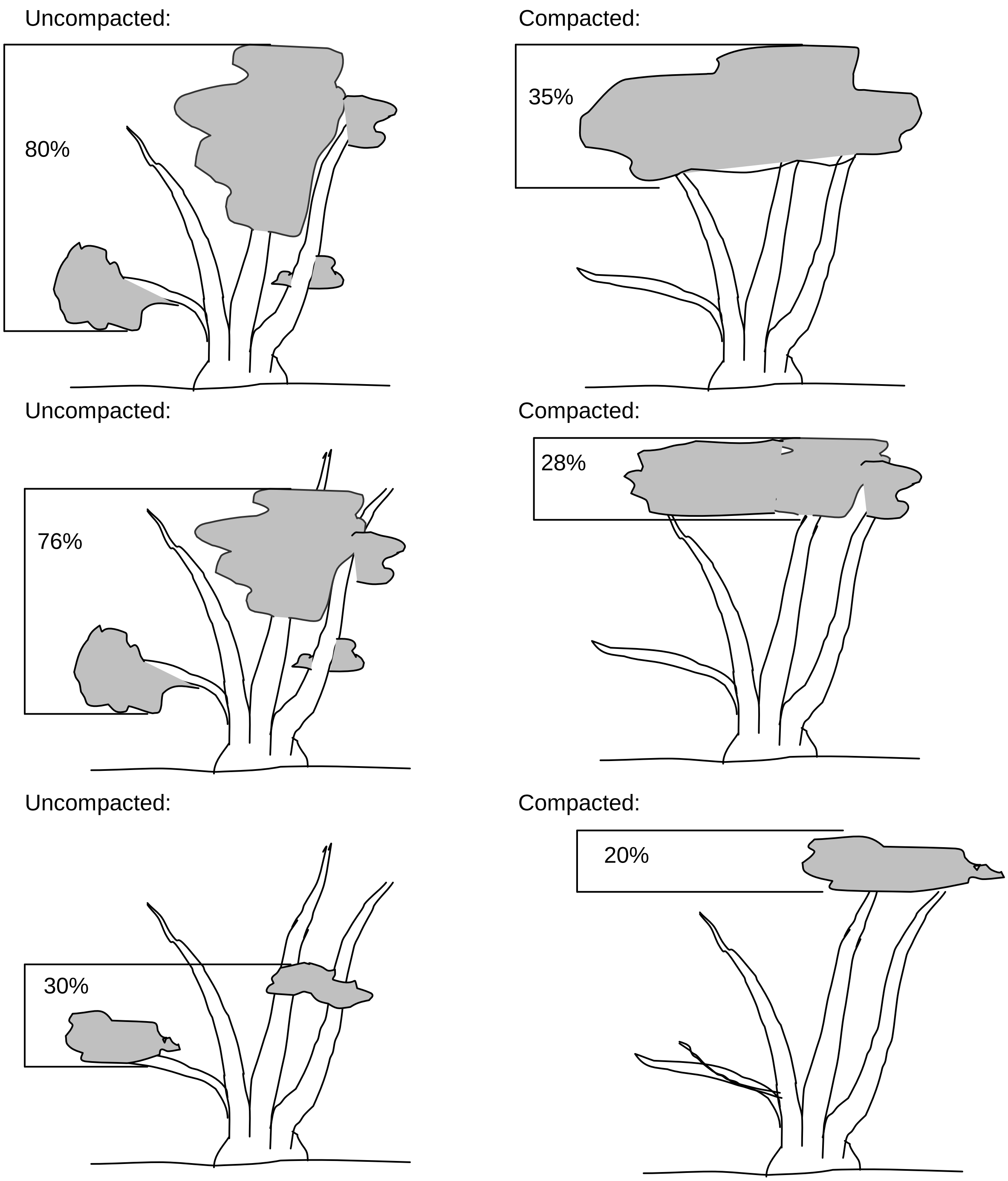


Figure 44. Examples of and comparison between COMPACTED CROWN RATIO and UNCOMPACTED LIVE CROWN RATIO of woodland species.

5.20 Tree Damage

NRS Note: The CORE OPTIONAL National "Tree Damage" variables will not be collected in our region.

5.20.1 DAMAGE LOCATION 1 (CORE OPTIONAL)

5.20.2 DAMAGE TYPE 1 (CORE OPTIONAL)

5.20.3 DAMAGE SEVERITY 1 (CORE OPTIONAL)

5.20.4 DAMAGE LOCATION 2 (CORE OPTIONAL)

5.20.5 DAMAGE TYPE 2 (CORE OPTIONAL)

5.20.6 DAMAGE SEVERITY 2 (CORE OPTIONAL)

5.20.7N DAMAGE AGENTS STANDARD **[1DAM, 2DAM]**

From the list provided record up to two damage agents observed in the live section of a tree (do not record the same damage twice on one tree). These damages may indicate either serious damage or merely a presence of an agent. If more than two DAMAGE AGENTS are observed, base decisions on the relative abundance of the agent prioritized and recorded based on location in the following order: roots, roots and lower bole, lower bole, lower and upper bole, upper bole, crown stem, and branches. Record the generic damage code (shown in bold) unless a more specific agent is listed. Treat two damages that fall on top of each other as two separate damages (e.g. canker with rot would be recorded as 250 and 260).

Note: Not all damage agents are listed for the region.

Note: Do not code 500 (Weather) for "Frost" cracks in the bole.

Note: Do not record damages in a dead top unless the dead top is a direct result of the damage.

When Collected: All live trees ≥ 5.0 in DBH/DRC
Field width: 3 digits
Tolerance: No errors
MQO: At least 80% of the time
Values:

CODE	DAMAGE	HOST SPECIES	SEVERITY
000	Healthy (no damage)	All	
100	Insect defoliators	All	> 20% affected
113	Gypsy moth	Hardwood	Any occurrence of defoliation. Presence of egg mass not sufficient to code damage
130	Shoot and branch insects	All	Any occurrence on leader; > 20% branches affected
140	Branch gall insects	All	> 20% affected
150	Bole borers	All	Any occurrence on bole
170	Bark beetles	Conifer	> 20% crown dead/dying
190	Root / root collar insects	Conifer	Entire crown off-color/dead
200	Foliage disease	All	> 20% affected
210	Shoot blights	All	Any occurrence on leader; > 20% shoots affected
220	Mistletoe	0071, 0094, *0095*, 0105	Any occurrence

CODE	DAMAGE	HOST SPECIES	SEVERITY
240	Bole rusts	Pine	Any occurrence on bole
250	Bole cankers	Hardwood	Any occurrence on bole
251	*Eutypella* canker	Maple	Any occurrence on bole
252	*Hypoxylon* canker	0743, 0746	Any occurrence on bole
254	*Nectria* canker	Hardwood	Any occurrence on bole
257	Butternut canker	0601	Any occurrence on tree
260	Stem decay (heart rot)	All	Any occurrence on bole
271	Ash yellows	Ash	Any occurrence
281	Dutch elm disease	Elm	Any occurrence
282	Oak wilt	Oak	Any occurrence
290	Root / butt rot	All	Any occurrence
291	*Annosus* root rot	Conifer	Any occurrence
292	*Armillaria* root rot	All	> 20% dieback
300	Fire	All	> 20% crown affected; any to leader; any to bole cambium
400	Animal damage	All	> 20% crown affected; any to leader; any to bole cambium
500	Weather	All	> 20% crown affected; any to leader; any to bole cambium
800	Logging / TSI / Other human	All	> 20% crown affected; any to leader; any to bole cambium
860	Chemical	All	> 20% crown affected

5.21 CAUSE OF DEATH **[CAUS]**

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.

NRS Note: A remeasure tree that has died and is now in a nonforest condition is assigned the appropriate CAUSE OF DEATH. For example, a tree that was previously live in accessible forest land and died due to disease in a residential area is coded as 20.

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 in the PDR.
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)

NRS Note: This variable is not collected in our region.

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 **[DECA]**

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

When Collected: All standing dead tally trees $\geq$ 5.0 in DBH/DRC
Field width: 1 digit
Tolerance: +/- 1 class
MQO: At least 90% of the time
Values: Use the following table for guidelines:

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) [DIAH]

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.

NRS Note: Record diameter height for all trees not measured at 4.5 feet, even if diameter was previously monumented.

When Collected: CORE OPTIONAL: All live and dead tally trees (except woodland species) ≥ 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)

NRS-ME – See Regional Appendix D

5.26 DWARF MISTLETOE CLASS (CORE OPTIONAL)

NRS Note: This variable is not collected in our region.

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 ≥ 1.0 in DBH/DRC
Field width: 1 digit
Tolerance: +/- 1 class
MQO: At least 90% of the time
Values: 0 to 6

5.27 TREE NOTES

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

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

PREVIOUS TREE NOTES FOR REFERENCE ONLY – DO NOT APPLY THESE CODES
The following is a listing of the former Northeast TREE NOTES from regional guide version 3.0. Current printed plotsheets display previous tree notes tallied during the last visit. Due to space restrictions for the Note section on the plotsheets, some of the printed notes will be truncated.

Values:

0	No notes
1	Witness tree
2	High diameter – above 4.5 feet
3	Low diameter – below 4.5 feet
4	Abnormal diameter
5	Metal (wire, nails, etc.) in butt log
6	Species misidentified at previous occasion
7	One of a clump of two or more trees (i.e., pith separation occurs below 4.5 feet)
8	Fork (i.e., pith separation occurs above 4.5 feet), crook, or split in the butt 16 feet
9	Not listed, see PLOT NOTES for details

5.31N FOREST TO NONFOREST VARIABLES

Tree and/or saplings previously tallied on accessible forest land and are now located in a nonforest condition require the following variables.

Number	Data Element Name	PDR Prompt
5.2	TREE RECORD NUMBER	TR#
5.3	CONDITION CLASS NUMBER	CON#
5.4	AZIMUTH	AZM
5.5	HORIZONTAL DISTANCE	DIST
5.6	PREVIOUS TREE STATUS	PAST
5.7	PRESENT TREE STATUS	STAT
5.7.1	RECONCILE	RECO
5.7.2	STANDING DEAD	DEAD
5.8	SPECIES	SPP
5.21	CAUSE OF DEATH	CAUS

Note: A RECONCILE code is required if PRESENT TREE STATUS = 0. A STANDING DEAD code is required if PRESENT TREE STATUS = 2.

Ingrowth trees are not tallied. Missed trees from the last cycle are not to be reconciled, since the collection of this data is subjective due to the condition change. Erroneously tallied trees from the last cycle can be reconciled if it is determined that a cruiser error or a procedural change has taken place since the last cycle.

NRS PDR Note: To prevent trees from mistakenly being coded on a non-forest condition, each tree will receive the following critical PDR message: "You have a tree on a non-forest condition. This is only valid if condition went from forest to non-forest."

When collected: All trees when previous CONDITION CLASS STATUS = 1 and current CONDITION CLASS STATUS = 2, 3, 4 or 5

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 may be estimated. Only count seedlings occurring in accessible forest land condition classes.

NRS Note: A seedling is measured from the base to the tip of the terminal bud. If the minimum length requirement is met for either a hardwood or softwood, the seedling is tallied.

6.1 SUBPLOT NUMBER

Use the same procedures described in Section 3.1.

When Collected: All counts of seedlings

6.2 SPECIES **[SPP]**

Use the same procedures described in Section 5.8.

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

6.3 CONDITION CLASS NUMBER **[CON#]**

Use the same procedures described in Section 2.0.

When Collected: All counts of seedlings

6.4 SEEDLING COUNT **[SED#]**

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.
NRS (West) Note: This applies to Rocky Mountain juniper (0066) in the states of KS, NE, ND and SD.

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.

NRS Note: If snow amounts are excessive on the microplot, the seedling tally is restricted to seedlings visible above the snow. Do not excavate snow from the microplot to achieve a better measurement. This practice may compromise the integrity of the microplot by exposing seedlings and other vegetation to animal browsing; and by exposing seedlings to extreme temperatures that may lead to mortality.

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

6.5N-ME SHRUB AND VINE DATA FOR THE MAINE INVENTORY

See Regional Appendix D for state and/or species specific variable data collection procedures and codes.

6.5.1N-ME SUBPLOT NUMBER

6.5.2N-ME SHRUB AND VINE SPECIES **[SPP]**

6.5.3N-ME CONDITION CLASS NUMBER **[CON#]**

6.5.4N-ME SHRUB COUNT **[SHRU]**

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
- On the previous visit the selected site tree(s) did not yield suitable site information.
- Since the last visit there has been a change in condition class that renders the previous data incompatible with the current conditions

NRS PDR Note: On a remeasurement plot, site index data collected on the last occasion will be downloaded to the PDR. The data must be reviewed. If the site index data are no longer valid (i.e., does not meet current site tree selection criteria or is no longer suitable for the condition), the data are deleted and new site index data are required. If no data are downloaded, site index data are required for the forested condition. All new plots with accessible forest land or plots that have changed from nonforest to forest require site index data. If multiple remeasurement site trees are present for a condition, keep all that have valid site index data.

If a site tree is needed; select a tree from a species common to the condition class being sampled, based on the criteria listed below 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 or site trees are not collected, record the reason in the PDR plot notes and leave this section blank.

NRS Note: All of the text applicable to NRS from Appendix 4 has been integrated into this section to eliminate the need to reference the appendix. Appendix 4 remains intact with NRS modifications but isn't required as a reference.

NRS Note: A suitable site index tree must not be further than 200 ft from any subplot center and must be off the subplots.

NRS Note: A tree cored for stand age may or may not be suitable site tree. If the tree cored for stand age meets the site tree selection criteria, then this tree can be used for both stand age and site index.

NRS Note: Site index trees that are 5.0" DBH and larger should be selected if available. If no site index trees 5.0" DBH or larger are available then trees from 3.0" DBH - 4.9" DBH should be selected. Trees used for Site Index that are under 5.0" DBH will need to be re-input as a new tree at time of next inventory with next available Tree Record Number. Do not select trees less than 3.0" DBH. Site trees should be at least 20 years old actual age. Actual Age can be calculated by adding “Add Years” to DBH age. The “Add Years” can be found in the Site Index Curves booklet. If no suitable site index trees 20 years actual age or older are available, then trees 15 - 19 years old actual age can be selected. Site trees should be less than 120 years old actual age. If no suitable site index trees 120 years old actual age and less are available then trees 200 years old actual age and less can be selected. The Legal files are set at 10 to 200.

NRS Note: In the East, do not establish a new site index species of 602 (Black Walnut) or 762 (Black Cherry). In the West, do not establish a new site index species of 602 (Black Walnut). These species can remain as site index trees if they have already been established.

NRS Note: If any site tree data item is changed other than Condition List the old tree record must be deleted and a new tree record with the next available Tree Record Number will be created.

Eastern U.S. Site-Tree Selection Criteria modified for the North

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.

7.2 Site Tree Data Variables

7.2.0N TREE RECORD NUMBER **[TR#]**

Record a code to uniquely and permanently identify each site index tree. On remeasured plots, use the previously assigned site index tree number. These trees will keep their original number as long as the meet the criteria for site trees. If a new tree is selected, use the “next available tree number” function on the *MIDAS PDR Application* to assign a number.

When Collected: All site trees
Field width: 3 digits
Tolerance: No errors
MQO: At least 99% of the time
Values: 001 to 999

7.2.1 CONDITION CLASS LIST **[CONL]**

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

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

7.2.2 SPECIES **[SPP]**

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

NRS Note: The species table below has been modified for the Northern region. Species indicated with an "E" are acceptable to core in the eastern states. Species indicated with a "W" are acceptable to core in the western states. "East" is defined as Ohio and West Virginia and all NRS states east; "West" is defined as Michigan and Indiana and all NRS states west.

When Collected: All site trees

Values:

Code	**Common Name**	**NRS**	
0012	balsam fir	E	W
0043	Atlantic white-cedar	E	
0068	eastern redcedar	E	W
0070	larch (introduced)	E	
0071	tamarack (native)	E	W
0094	white spruce	E	W
0095	black spruce	E	W
0097	red spruce	E	
0105	jack pine	E	W
0110	shortleaf pine	E	W
0122	Ponderosa pine		W
0125	red pine	E	W
0128	pond pine	E	
0129	eastern white pine	E	W
0130	Scotch pine	E	W
0131	loblolly pine	E	
0132	Virginia pine	E	
0241	northern white cedar	E	W
0261	eastern hemlock	E	W
0316	red maple	E	W
0317	silver maple	E	W
0318	sugar maple	E	W
0371	yellow birch	E	W
0375	paper birch	E	W
0402	bitternut hickory	E	W
0403	pignut hickory		W
0404	pecan		W
0405	Shellbark hickory		W
0407	shagbark hickory	E	W
0408	black hickory		W
0409	mockernut hickory		W
0462	hackberry		W
0531	American beech	E	W
0541	white ash	E	W
0543	black ash	E	W
0544	green ash	E	W
0611	sweetgum	E	W
0621	yellow-poplar	E	W
0741	balsam poplar		W
0742	eastern cottonwood	E	W
0743	bigtooth aspen	E	W
0746	quaking aspen	E	W

Code	Common Name	NRS	
0762	black cherry		W
0802	white oak	E	W
0806	scarlet oak	E	W
0809	northern pin oak		W
0812	southern red oak	E	
0813	cherrybark oak	E	
0817	shingle oak	E	W
0823	bur oak		W
0827	water oak	E	
0830	pin oak	E	W
0832	chestnut oak	E	
0833	northern red oak	E	W
0835	post oak	E	W
0837	black oak	E	W
0901	black locust	E	W
0951	American basswood	E	W
0972	American elm	E	W
0975	slippery elm		W
0977	rock elm		W

7.2.3 DIAMETER **[DBH]**

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 **[HGHT]**

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 **[AGE]**

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) **[SUB#]**

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

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

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

NRS East Note: If a Site Index Tree is populated in the historical file without location information (Subplot Number, Azimuth, and Horizontal Distance) and is still a valid SI tree, keep the tree and leave these three items blank in the data recorder.

7.2.8 AZIMUTH (CORE OPTIONAL) **[AZM]**

Record the AZIMUTH from the subplot center; sight the center of the base of each tree with a compass. Record the 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

NRS East Note: If a Site Index Tree is populated in the historical file without location information (Subplot Number, Azimuth, and Horizontal Distance) and is still a valid SI tree, keep the tree and leave these three items blank in the data recorder.

7.2.9 HORIZONTAL DISTANCE (CORE OPTIONAL) **[DIST]**

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

NRS Note: A suitable site index tree must not be further than 200 ft from any subplot center.

NRS East Note: If a Site Index Tree is populated in the historical file without location information (Subplot Number, Azimuth, and Horizontal Distance) and is still a valid SI tree, keep the tree and leave these three items blank in the data recorder.

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

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.

NRS Note: Nonforest inventories are not conducted in our region, i.e. NONFOREST SAMPLING STATUS = 1.

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.

NRS Note: Invasive data will be collected on approximately 20% of the total number of field plots during the window of May 1 through September 30.

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) (Downloaded "hidden" value)
2 Invasive plant data collected on all accessible land conditions (CONDITION CLASS STATUS = 1 OR NONFOREST CONDITION STATUS = 2)

NRS Note: Nonforest inventories are not conducted in our region, i.e. NONFOREST CONDITIOIN 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 **[INST] (**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.

NRS Note: INVASIVE PLANT SUBPLOT STATUS of 3 is not a valid code in our region; therefore INVASIVE PLANT NONSAMPLED REASON is not collected.

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

NRS Note: Add notes for condition information when in the PDR Condition screen pressing the “Ctrl”+“N”.

9.8 CONDITION CLASS NUMBER **[CON#]**
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 **[ISPP]**

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).

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.

NRS Note: For the four invasive *Lonicera* shrub species record in NRS, use the LONIC code if you cannot key out to species. All others key to species.

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.

9.9.1N **UNKNOWN PLANTS AND VOUCHER SPECIMEN COLLECTION**

Collection of a plant specimen is required if
1)You cannot quickly and confidently ID a plant that you think is on our invasive plants list.

2) You find one of the invasive plants on our list, but it has not been found in the State the plot is located. Use the field ID guide, A Guide to Nonnative Invasive Plants Inventoried in the North by Forest Inventory and Analysis, by Cassandra Olson and Anita F. Cholewa, to determine which

states the invasive has not been recorded. The distribution maps in these guides are from the NRCS Plants Database.

Follow these Basic Steps:

1. Assign a valid NRCS PLANTS Genus (listed in appendix 9) or Unknown CODE (listed in 9.9) and assign a unique species number (see 9.10)
2. Record if a specimen was collected or not in INVASIVE SPECIMEN COLLECTED,(see 9.13).
3. When a specimen is collected, enter a SPECIMEN LABEL NUMBER(see 9.14). Place the pre-printed label with the corresponding label number in the bag with the specimen.
4. If no specimen is collected, record in INVASIVE PLANT NOTES why(see 9.15).
5. Describe the unknown species in INVASIVE PLANT NOTES(see 9.15).
6. Record the canopy cover estimates for the sample units where the plant was encountered, as for any identified species.

SPECIAL SAFETY NOTE FOR NRS: Please do not collect known hazardous plants, such as *Ailanthus altissima* or *Heracleum mantegazzianum* (Giant hogweed). These plants are known to cause blisters and/or rashes. For more information, go to the following website and see section on Special P2/P3 alerts: http://nrs.fs.fed.us/fia/safety

9.10 UNIQUE SPECIES NUMBER **[UNQ#]**

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 (for unknown species codes)
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 **[PCOV]**

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.

NRS Note: The SPECIES CANOPY COVER percent cannot exceed the percent area represented for the forested condition

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

NRS NOTE: This is a hidden variable and will be recorded as code 1, so you will not see this on the PDR screen.

9.13 INVASIVE SPECIMEN COLLECTED **[VOUC]**
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 **[LABL]**

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.

NRS PDR Note: MIDAS will auto populate the SPECIMEN LABEL NUMBER with a unique code, when INVASIVE SPECIMEN COLLECTED = 1.

9.14.1N FIELD SPECIMEN LABEL

Revised data collection software auto-generates a label number when a specimen is collected. Write out the generated LABEL NUMBER on a small piece of paper and include it in the bag with the specimen.

Label Number:1
Date: 8/06/03
Unknown Code: ACANT2
Unique Species Nbr: 1
Veg Spec. crew number: John Doe

Figure 24-2N. Example of field label for unknown specimen.

9.14.2N Official Specimen Label

Official specimen labels are printed from plot data and accompany the unknown (or voucher) 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 Voucher

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: John Doe

State: State name **County:** County name

Community type(s) where found: bottomland, old stripmine
ridgetop with atv trl, stripped yrs ago moist bottom

Species Notes: delicate, hairy joints

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

NRS NOTE: Recorded this note while in the invasive species record. Press the "Ctrl"+"N".

Listed are reasons why a specimen was not collected from 4.0:

- Species is locally sparse
- Species has less than 1% canopy cover on the subplot and no mature foliate or reproductive parts are present
- Hazardous situation
- Time limitation
- Already collected with previous entry of genus or unknown code with the same unique species number
- Specimen collected for immediate/local identification only
- Other (explain in notes)

9.16 References

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

Appendix 1+N. State, Unit, County, Parish or Borough FIPS codes

States are sorted by county.

State		Unit	County		Unit	County cont'd.	
09	**CT**	**1**	001	Fairfield	**1**	009	New Haven
		1	003	Hartford	**1**	011	New London
		1	005	Litchfield	**1**	013	Tolland
		1	007	Middlesex	**1**	015	Windham
10	**DE**	**1**	001	Kent			
		1	003	New Castle			
		1	005	Sussex			
11	**DC**	**1**	001	District of Columbia			
17	**IL**	**3**	001	Adams	**3**	103	Lee
		1	003	Alexander	**3**	105	Livingston
		2	005	Bond	**3**	107	Logan
		3	007	Boone	**3**	109	McDonough
		3	009	Brown	**3**	111	McHenry
		3	011	Bureau	**3**	113	McLean
		2	013	Calhoun	**3**	115	Macon
		3	015	Carroll	**2**	117	Macoupin
		3	017	Cass	**2**	119	Madison
		3	019	Champaign	**2**	121	Marion
		3	021	Christian	**3**	123	Marshall
		2	023	Clark	**3**	125	Mason
		2	025	Clay	**1**	127	Massac
		2	027	Clinton	**3**	129	Menard
		3	029	Coles	**3**	131	Mercer
		3	031	Cook	**2**	133	Monroe
		2	033	Crawford	**2**	135	Montgomery
		2	035	Cumberland	**3**	137	Morgan
		3	037	DeKalb	**3**	139	Moultrie
		3	039	De Witt	**3**	141	Ogle
		3	041	Douglas	**3**	143	Peoria
		3	043	DuPage	**1**	145	Perry
		3	045	Edgar	**3**	147	Piatt
		2	047	Edwards	**3**	149	Pike
		2	049	Effingham	**1**	151	Pope
		2	051	Fayette	**1**	153	Pulaski
		3	053	Ford	**3**	155	Putnam
		1	055	Franklin	**1**	157	Randolph
		3	057	Foulton	**2**	159	Richland
		1	059	Gallatin	**3**	161	Rock Island
		2	061	Greene	**2**	163	St. Clair
		3	063	Grundy	**1**	165	Saline
		1	065	Hamilton	**3**	167	Sangamon
		3	067	Hancock	**3**	169	Schuyler
		1	069	Hardin	**3**	171	Scott
		3	071	Henderson	**2**	173	Shelby
		3	073	Henry	**3**	175	Stark
		3	075	Iroquois	**3**	177	Stephenson
		1	077	Jackson	**3**	179	Tazewell
		2	079	Jasper	**1**	181	Union
		2	081	Jefferson	**3**	183	Vermilion
		2	083	Jersey	**2**	185	Wabash

		3	085	JoDaviess	**3**	187	Warren
		1	087	Johnson	**2**	189	Washington
		3	089	Kane	**2**	191	Wayne
		3	091	Kankakee	**1**	193	White
		3	093	Kendall	**3**	195	Whiteside
		3	095	Knox	**3**	197	Will
		3	097	Lake	**1**	199	Williamson
		3	099	La Salle	**3**	201	Winnebago
		2	101	Lawrence	**3**	203	Woodford
18	**IN**	**4**	001	Adams	**2**	093	Lawrence
		4	003	Allen	**4**	095	Madison
		4	005	Bartholome	**4**	097	Marion
		4	007	Benton	**4**	099	Marshall
		4	009	Blackford	**1**	101	Martin
		4	011	Boone	**4**	103	Miami
		2	013	Brown	**2**	105	Monroe
		4	015	Carroll	**4**	107	Montgomery
		4	017	Cass	**2**	109	Morgan
		2	019	Clark	**4**	111	Newton
		1	021	Clay	**4**	113	Noble
		4	023	Clinton	**3**	115	Ohio
		2	025	Crawford	**2**	117	Orange
		1	027	Daviess	**2**	119	Owen
		3	029	Dearborn	**1**	121	Parke
		4	031	Decatur	**2**	123	Perry
		4	033	De Kalb	**1**	125	Pike
		4	035	Delaware	**4**	127	Porter
		2	037	Dubois	**1**	129	Posey
		4	039	Elkhart	**4**	131	Pulaski
		3	041	Fayette	**1**	133	Putnam
		2	043	Floyd	**4**	135	Randolph
		4	045	Fountain	**3**	137	Ripley
		3	047	Franklin	**4**	139	Rush
		4	049	Fulton	**4**	141	St. Joseph
		1	051	Gibson	**2**	143	Scott
		4	053	Grant	**4**	145	Shelby
		1	055	Greene	**2**	147	Spencer
		4	057	Hamilton	**4**	149	Starke
		4	059	Hancock	**4**	151	Steuben
		2	061	Harrison	**1**	153	Sullivan
		4	063	Hendricks	**3**	155	Switzerland
		4	065	Henry	**4**	157	Tippicanoe
		4	067	Howard	**4**	159	Tipton
		4	069	Huntington	**3**	161	Union
		2	071	Jackson	**1**	163	Vanderburg
		4	073	Jasper	**1**	165	Vermillion
		4	075	Jay	**1**	167	Vigo
		3	077	Jefferson	**4**	169	Wabash
		3	079	Jennings	**4**	171	Warren
		4	081	Johnson	**2**	173	Warrick
		1	083	Knox	**2**	175	Washington
		4	085	Kosciusko	**4**	177	Wayne
		4	087	Lagrange	**4**	179	Wells
		4	089	Lake	**4**	181	White
		4	091	La Porte	**4**	183	Whitley
19	**IA**	**3**	001	Adair	**2**	101	Jefferson
		3	003	Adams	**1**	103	Johnson
		1	005	Allamakee	**1**	105	Jones
		2	007	Appanoose	**2**	107	Keokuk

		3	009	Audubon	**4**	109	Kossuth
		1	011	Benton	**2**	111	Lee
		1	013	Black Hawk	**1**	113	Linn
		2	015	Boone	**2**	115	Louisa
		1	017	Bremer	**2**	117	Lucas
		1	019	Buchanan	**4**	119	Lyon
		4	021	Buena Vist	**2**	121	Madison
		1	023	Butler	**2**	123	Mahaska
		4	025	Calhoun	**2**	125	Marion
		3	027	Carroll	**2**	127	Marshall
		3	029	Cass	**3**	129	Mills
		1	031	Cedar	**1**	131	Mitchell
		4	033	Cerro Gord	**3**	133	Monona
		4	035	Cherokee	**2**	135	Monroe
		1	037	Chickasaw	**3**	137	Montgomery
		2	039	Clarke	**2**	139	Muscatine
		4	041	Clay	**4**	141	O'Brien
		1	043	Clayton	**4**	143	Osceola
		1	045	Clinton	**3**	145	Page
		3	047	Crawford	**4**	147	Palo Alto
		2	049	Dallas	**4**	149	Plymouth
		2	051	Davis	**4**	151	Pocahontas
		2	053	Decatur	**2**	153	Polk
		1	055	Delaware	**3**	155	Pottawatta
		2	057	DesMoines	**2**	157	Poweshiek
		4	059	Dickinson	**3**	159	Ringgold
		1	061	Dubuque	**4**	161	Sac
		4	063	Emmet	**1**	163	Scott
		1	065	Fayette	**3**	165	Shelby
		1	067	Floyd	**4**	167	Sioux
		4	069	Franklin	**2**	169	Story
		3	071	Fremont	**1**	171	Tama
		3	073	Greene	**3**	173	Taylor
		1	075	Grundy	**3**	175	Union
		2	077	Guthrie	**2**	177	Van Buren
		2	079	Hamilton	**2**	179	Wapello
		4	081	Hancock	**2**	181	Warren
		2	083	Hardin	**2**	183	Washington
		3	085	Harrison	**2**	185	Wayne
		2	087	Henry	**2**	187	Webster
		1	089	Howard	**4**	189	Winnebago
		4	091	Humboldt	**1**	191	Winneshiek
		4	093	Ida	**3**	193	Woodbury
		2	095	Iowa	**4**	195	Worth
		1	097	Jackson	**4**	197	Wright
		2	099	Jasper			

20	**KS**	**2**	001	Allen	**2**	107	Linn
		2	003	Anderson	**3**	109	Logan
		1	005	Atchison	**2**	111	Lyon
		3	007	Barber	**3**	113	McPherson
		3	009	Barton	**2**	115	Marion
		2	011	Bourbon	**1**	117	Marshall
		1	013	Brown	**3**	119	Meade
		2	015	Butler	**1**	121	Miami
		2	017	Chase	**3**	123	Mitchell
		2	019	Chautauqua	**2**	125	Montgomery
		2	021	Cherokee	**2**	127	Morris
		3	023	Cheyenne	**3**	129	Morton
		3	025	Clark	**1**	131	Nemaha
		1	027	Clay	**2**	133	Neosho
		3	029	Cloud	**3**	135	Ness

		2	031	Coffey	**3**	137	Norton
		3	033	Comanche	**1**	139	Osage
		2	035	Cowley	**3**	141	Osborne
		2	037	Crawford	**3**	143	Ottawa
		3	039	Decatur	**3**	145	Pawnee
		1	041	Dickinson	**3**	147	Phillips
		1	043	Doniphan	**1**	149	Pottawatomie
		1	045	Douglas	**3**	151	Pratt
		3	047	Edwards	**3**	153	Rawlins
		2	049	Elk	**3**	155	Reno
		3	051	Ellis	**3**	157	Republic
		3	053	Ellsworth	**3**	159	Rice
		3	055	Finney	**1**	161	Riley
		3	057	Ford	**3**	163	Rooks
		1	059	Franklin	**3**	165	Rush
		1	061	Geary	**3**	167	Russell
		3	063	Gove	**3**	169	Saline
		3	065	Graham	**3**	171	Scott
		3	067	Grant	**3**	173	Sedgwick
		3	069	Gray	**3**	175	Seward
		3	071	Greeley	**1**	177	Shawnee
		2	073	Greenwood	**3**	179	Sheridan
		3	075	Hamilton	**3**	181	Sherman
		3	077	Harper	**3**	183	Smith
		3	079	Harvey	**3**	185	Stafford
		3	081	Haskell	**3**	187	Stanton
		3	083	Hodgeman	**3**	189	Stevens
		1	085	Jackson	**3**	191	Sumner
		1	087	Jefferson	**3**	193	Thomas
		3	089	Jewell	**3**	195	Trego
		1	091	Johnson	**1**	197	Wabaunsee
		3	093	Kearny	**3**	199	Wallace
		3	095	Kingman	**1**	201	Washington
		3	097	Kiowa	**3**	203	Wichita
		2	099	Labette	**2**	205	Wilson
		3	101	Lane	**2**	207	Woodson
		1	103	Leavenworth	**1**	209	Wyandotte
		3	105	Lincoln			
23	**ME**	**8**	001	Androscoggin	**9**	017	Oxford
		2	003	Aroostook	**3**	019	Penobscot
		8	005	Cumberland	**5**	021	Piscataquis
		9	007	Franklin	**8**	023	Sagadahoc
		4	009	Hancock	**7**	025	Somerset
		6	011	Kennebec	**6**	027	Waldo
		6	013	Knox	**1**	029	Washington
		6	015	Lincoln	**8**	031	York
24	**MD**	**5**	001	Allegany	**2**	027	Howard
		2	003	Anne Arundel	**2**	029	Kent
		2	005	Baltimore	**2**	031	Montgomery
		3	009	Calvert	**2**	033	Prince George's
		2	011	Caroline	**2**	035	Queen Anne's
		2	013	Carroll	**3**	037	St. Mary's
		2	015	Cecil	**4**	039	Somerset
		3	017	Charles	**2**	041	Talbot
		4	019	Dorchester	**2**	043	Washington
		2	021	Frederick	**4**	045	Wicomico
		5	023	Garrett	**4**	047	Worcester
		2	025	Harford	**2**	510	Baltimore City

25	**MA**	**1**	001	Barnstable	**1**	015	Hampshire
		1	003	Berkshire	**1**	017	Middlesex
		1	005	Bristol	**1**	019	Nantucket
		1	007	Dukes	**1**	021	Norfolk
		1	009	Essex	**1**	023	Plymouth
		1	011	Franklin	**1**	025	Suffolk
		1	013	Hampden	**1**	027	Worcester
26	**MI**	**3**	001	Alcona	**3**	085	Lake
		1	003	Alger	**4**	087	Lapeer
		4	005	Allegan	**3**	089	Leelanau
		3	007	Alpena	**4**	091	Lenawee
		3	009	Antrim	**4**	093	Livingston
		3	011	Arenac	**1**	095	Luce
		2	013	Baraga	**1**	097	Mackinac
		4	015	Barry	**4**	099	Macomb
		3	017	Bay	**3**	101	Manistee
		3	019	Benzie	**2**	103	Marquette
		4	021	Berrien	**3**	105	Mason
		4	023	Branch	**3**	107	Mecosta
		4	025	Calhoun	**1**	109	Menominee
		4	027	Cass	**3**	111	Midland
		3	029	Charlevoix	**3**	113	Missaukee
		3	031	Cheboygan	**4**	115	Monroe
		1	033	Chippewa	**4**	117	Montcalm
		3	035	Clare	**3**	119	Montmorenc
		4	037	Clinton	**4**	121	Muskegon
		3	039	Crawford	**3**	123	Newaygo
		1	041	Delta	**4**	125	Oakland
		2	043	Dickinson	**3**	127	Oceana
		4	045	Eaton	**3**	129	Ogemaw
		3	047	Emmet	**2**	131	Ontonagon
		4	049	Genesee	**3**	133	Osceola
		3	051	Gladwin	**3**	135	Oscoda
		2	053	Gogebic	**3**	137	Otsego
		3	055	Grand Traverse	**4**	139	Ottawa
		4	057	Gratiot	**3**	141	Presque Isle
		4	059	Hillsdale	**3**	143	Roscommon
		2	061	Houghton	**4**	145	Saginaw
		4	063	Huron	**4**	147	St. Clair
		4	065	Ingham	**4**	149	St. Joseph
		4	067	Ionia	**4**	151	Sanilac
		3	069	Iosco	**1**	153	Schoolcraft
		2	071	Iron	**4**	155	Shiawassee
		3	073	Isabella	**4**	157	Tuscola
		4	075	Jackson	**4**	159	Van Buren
		4	077	Kalamazoo	**4**	161	Washtenaw
		3	079	Kalkaska	**4**	163	Wayne
		4	081	Kent	**3**	165	Wexford
		2	083	Keweenaw			
27	**MN**	**2**	001	Aitkin	**4**	089	Marshall
		3	003	Anoka	**4**	091	Martin
		2	005	Becker	**4**	093	Meeker
		2	007	Beltrami	**3**	095	Mille Lacs
		3	009	Benton	**3**	097	Morrison
		4	011	Big Stone	**4**	099	Mower
		4	013	Blue Earth	**4**	101	Murray
		4	015	Brown	**4**	103	Nicollet
		1	017	Carlton	**4**	105	Nobles

		3	019	Carver	**4**	107	Norman
		2	021	Cass	**3**	109	Olmsted
		4	023	Chippewa	**3**	111	Otter Tail
		3	025	Chisago	**4**	113	Pennington
		4	027	Clay	**3**	115	Pine
		2	029	Clearwater	**4**	117	Pipestone
		1	031	Cook	**4**	119	Polk
		4	033	Cottonwood	**4**	121	Pope
		2	035	Crow Wing	**3**	123	Ramsey
		3	037	Dakota	**4**	125	Red Lake
		4	039	Dodge	**4**	127	Redwood
		3	041	Douglas	**4**	129	Renville
		4	043	Faribault	**3**	131	Rice
		3	045	Fillmore	**4**	133	Rock
		4	047	Freeborn	**2**	135	Roseau
		3	049	Goodhue	**1**	137	St. Louis
		4	051	Grant	**3**	139	Scott
		3	053	Hennepin	**3**	141	Sherburne
		3	055	Houston	**4**	143	Sibley
		2	057	Hubbard	**3**	145	Stearns
		3	059	Isanti	**4**	147	Steele
		2	061	Itasca	**4**	149	Stevens
		4	063	Jackson	**4**	151	Swift
		3	065	Kanabec	**3**	153	Todd
		4	067	Kandiyohi	**4**	155	Traverse
		4	069	Kittson	**3**	157	Wabasha
		1	071	Koochiching	**2**	159	Wadena
		4	073	Lac qui Parle	**4**	161	Waseca
		1	075	Lake	**3**	163	Washington
		2	077	Lake of the Woods	**4**	165	Watonwan
		3	079	Le Sueur	**4**	167	Wilkin
		4	081	Lincoln	**3**	169	Winona
		4	083	Lyon	**3**	171	Wright
		4	085	McLeod	**4**	173	Yellow Medicine
		2	087	Mahnomen			
29	**MO**	**4**	001	Adair	**4**	117	Livingston
		4	003	Andrew	**2**	119	McDonald
		4	005	Atchison	**4**	121	Macon
		4	007	Audrain	**1**	123	Madison
		2	009	Barry	**3**	125	Maries
		4	011	Barton	**4**	127	Marion
		4	013	Bates	**4**	129	Mercer
		3	015	Benton	**3**	131	Miller
		1	017	Bollinger	**5**	133	Mississippi
		5	019	Boone	**5**	135	Moniteau
		4	021	Buchanan	**4**	137	Monroe
		1	023	Butler	**5**	139	Montgomery
		4	025	Caldwell	**3**	141	Morgan
		5	027	Callaway	**5**	143	New Madrid
		3	029	Camden	**2**	145	Newton
		5	031	Cape Girar	**4**	147	Nodaway
		4	033	Carroll	**1**	149	Oregon
		1	035	Carter	**5**	151	Osage
		4	037	Cass	**2**	153	Ozark
		3	039	Cedar	**5**	155	Pemiscot
		4	041	Chariton	**5**	157	Perry
		2	043	Christian	**4**	159	Pettis
		4	045	Clark	**3**	161	Phelps
		4	047	Clay	**4**	163	Pike
		4	049	Clinton	**4**	165	Platte
		5	051	Cole	**3**	167	Polk

		4	053	Cooper	**3**	169	Pulaski
		1	055	Crawford	**4**	171	Putnam
		4	057	Dade	**4**	173	Ralls
		3	059	Dallas	**4**	175	Randolph
		4	061	Daviess	**4**	177	Ray
		4	063	DeKalb	**1**	179	Reynolds
		1	065	Dent	**1**	181	Ripley
		2	067	Douglas	**5**	183	St. Charle
		5	069	Dunklin	**3**	185	St. Clair
		5	071	Franklin	**5**	186	Ste. Genev
		5	073	Gasconade	**1**	187	St. Francois
		4	075	Gentry	**5**	189	St. Louis
		4	077	Greene	**4**	195	Saline
		4	079	Grundy	**4**	197	Schuyler
		4	081	Harrison	**4**	199	Scotland
		4	083	Henry	**5**	201	Scott
		3	085	Hickory	**1**	203	Shannon
		4	087	Holt	**4**	205	Shelby
		5	089	Howard	**5**	207	Stoddard
		2	091	Howell	**2**	209	Stone
		1	093	Iron	**4**	211	Sullivan
		4	095	Jackson	**2**	213	Taney
		4	097	Jasper	**2**	215	Texas
		5	099	Jefferson	**4**	217	Vernon
		4	101	Johnson	**5**	219	Warren
		4	103	Knox	**1**	221	Washington
		3	105	Laclede	**1**	223	Wayne
		4	107	Lafayette	**2**	225	Webster
		4	109	Lawrence	**4**	227	Worth
		4	111	Lewis	**2**	229	Wright
		4	113	Lincoln	**5**	510	St. Louis
		4	115	Linn			
31	**NE**	**1**	001	Adams	**1**	095	Jefferson
		2	003	Antelope	**1**	097	Johnson
		2	005	Arthur	**1**	099	Kearney
		2	007	Banner	**2**	101	Keith
		2	009	Blaine	**2**	103	Keya Paha
		1	011	Boone	**2**	105	Kimball
		2	013	Box Butte	**2**	107	Knox
		2	015	Boyd	**1**	109	Lancaster
		2	017	Brown	**2**	111	Lincoln
		1	019	Buffalo	**2**	113	Logan
		1	021	Burt	**2**	115	Loup
		1	023	Butler	**1**	117	Madison
		1	025	Cass	**2**	119	McPherson
		1	027	Cedar	**1**	121	Merrick
		2	029	Chase	**2**	123	Morrill
		2	031	Cherry	**1**	125	Nance
		2	033	Cheyenne	**1**	127	Nemaha
		1	035	Clay	**1**	129	Nuckolls
		1	037	Colfax	**1**	131	Otoe
		1	039	Cuming	**1**	133	Pawnee
		1	041	Custer	**2**	135	Perkins
		1	043	Dakota	**1**	137	Phelps
		2	045	Dawes	**1**	139	Pierce
		1	047	Dawson	**1**	141	Platte
		2	049	Deuel	**1**	143	Polk
		1	051	Dixon	**1**	145	Red Willow
		1	053	Dodge	**1**	147	Richardson
		1	055	Douglas	**2**	149	Rock
		2	057	Dundy	**1**	151	Saline

		1	059	Fillmore	**1**	153	Sarpy
		1	061	Franklin	**1**	155	Saunders
		1	063	Frontier	**2**	157	Scotts Bluff
		1	065	Furnas	**1**	159	Seward
		1	067	Gage	**2**	161	Sheridan
		2	069	Garden	**1**	163	Sherman
		2	071	Garfield	**2**	165	Sioux
		1	073	Gosper	**1**	167	Stanton
		2	075	Grant	**1**	169	Thayer
		1	077	Greeley	**2**	171	Thomas
		1	079	Hall	**1**	173	Thurston
		1	081	Hamilton	**1**	175	Valley
		1	083	Harlan	**1**	177	Washington
		2	085	Hayes	**1**	179	Wayne
		1	087	Hitchcock	**1**	181	Webster
		2	089	Holt	**2**	183	Wheeler
		2	091	Hooker	**1**	185	York
		1	093	Howard			
33	**NH**	**3**	001	Belknap	**3**	011	Hillsborough
		2	003	Carroll	**3**	013	Merrimack
		3	005	Cheshire	**3**	015	Rockingham
		2	007	Coos	**3**	017	Strafford
		2	009	Grafton	**3**	019	Sullivan
34	**NJ**	**1**	001	Atlantic	**1**	023	Middlesex
		1	003	Bergen	**1**	025	Monmouth
		1	005	Burlington	**1**	027	Morris
		1	007	Camden	**1**	029	Ocean
		1	009	Cape May	**1**	031	Passaic
		1	011	Cumberland	**1**	033	Salem
		1	013	Essex	**1**	035	Somerset
		1	015	Gloucester	**1**	037	Sussex
		1	017	Hudson	**1**	039	Union
		1	019	Hunterdon	**1**	041	Warren
		1	021	Mercer			
36	**NY**	**7**	001	Albany	**2**	063	Niagara
		5	003	Allegany	**3**	065	Onieda
		8	005	Bronx	**2**	067	Onondaga
		6	007	Broome	**2**	069	Ontario
		5	009	Cattaraugus	**8**	071	Orange
		2	011	Cayuga	**2**	073	Orleans
		5	013	Chautauqua	**2**	075	Oswego
		6	015	Chemung	**6**	077	Otsego
		6	017	Chenango	**8**	079	Putnam
		1	019	Clinton	**8**	081	Queens
		7	021	Columbia	**7**	083	Rensselaer
		6	023	Cortland	**8**	085	Richmond
		6	025	Delaware	**8**	087	Rockland
		8	027	Dutchess	**1**	089	St. Lawrence
		2	029	Erie	**7**	091	Saratoga
		4	031	Essex	**7**	093	Schenectady
		1	033	Franklin	**8**	095	Schoharie
		3	035	Fulton	**6**	097	Schuyler
		2	037	Genesee	**2**	099	Seneca
		8	039	Greene	**5**	101	Steuben
		4	041	Hamilton	**8**	103	Suffolk
		3	043	Herkimer	**8**	105	Sullivan
		1	045	Jefferson	**6**	107	Tioga

		8	047	Kings	**6**	109	Tompkins
		3	049	Lewis	**8**	111	Ulster
		2	051	Livingston	**4**	113	Warren
		2	053	Madison	**7**	115	Washington
		2	055	Monroe	**2**	117	Wayne
		7	057	Montgomery	**8**	119	Westchester
		8	059	Nassau	**2**	121	Wyoming
		8	061	New York	**2**	123	Yates
38	**ND**	**1**	001	Adams	**1**	055	McLean
		1	003	Barnes	**1**	057	Mercer
		1	005	Benson	**1**	059	Morton
		1	007	Billings	**1**	061	Mountrail
		1	009	Bottineau	**1**	063	Nelson
		1	011	Bowman	**1**	065	Oliver
		1	013	Burke	**1**	067	Pembina
		1	015	Burleigh	**1**	069	Pierce
		1	017	Cass	**1**	071	Ramsey
		1	019	Cavalier	**1**	073	Ransom
		1	021	Dickey	**1**	075	Renville
		1	023	Divide	**1**	077	Richland
		1	025	Dunn	**1**	079	Rolette
		1	027	Eddy	**1**	081	Sargent
		1	029	Emmons	**1**	083	Sheridan
		1	031	Foster	**1**	085	Sioux
		1	033	Golden Valley	**1**	087	Slope
		1	035	Grand Fork	**1**	089	Stark
		1	037	Grant	**1**	091	Steele
		1	039	Griggs	**1**	093	Stutsman
		1	041	Hettinger	**1**	095	Towner
		1	043	Kidder	**1**	097	Traill
		1	045	LaMoure	**1**	099	Walsh
		1	047	Logan	**1**	101	Ward
		1	049	McHenry	**1**	103	Wells
		1	051	McIntosh	**1**	105	Williams
		1	053	McKenzie			
39	**OH**	**1**	001	Adams	**5**	089	Licking
		6	003	Allen	**6**	091	Logan
		4	005	Ashland	**4**	093	Lorain
		4	007	Ashtabula	**6**	095	Lucas
		2	009	Athens	**5**	097	Madison
		6	011	Auglaize	**4**	099	Mahoning
		3	013	Belmont	**6**	101	Marion
		1	015	Brown	**4**	103	Medina
		5	017	Butler	**2**	105	Meigs
		3	019	Carroll	**6**	107	Mercer
		6	021	Champaign	**5**	109	Miami
		5	023	Clark	**3**	111	Monroe
		1	025	Clermont	**5**	113	Montgomery
		5	027	Clinton	**2**	115	Morgan
		4	029	Columbiana	**6**	117	Morrow
		3	031	Coshocton	**3**	119	Muskingum
		6	033	Crawford	**3**	121	Noble
		4	035	Cuyahoga	**6**	123	Ottawa
		5	037	Darke	**6**	125	Paulding
		6	039	Defiance	**2**	127	Perry
		6	041	Delaware	**5**	129	Pickaway
		4	043	Erie	**1**	131	Pike
		5	045	Fairfield	**4**	133	Portage
		5	047	Fayette	**5**	135	Preble

		5	049	Franklin	**6**	137	Putnam
		6	051	Fulton	**4**	139	Richland
		1	053	Gallia	**1**	141	Ross
		4	055	Geauga	**6**	143	Sandusky
		5	057	Greene	**1**	145	Scioto
		3	059	Guernsey	**6**	147	Seneca
		5	061	Hamilton	**6**	149	Shelby
		6	063	Hancock	**4**	151	Stark
		6	065	Hardin	**4**	153	Summit
		3	067	Harrison	**4**	155	Trumbull
		6	069	Henry	**3**	157	Tuscarawas
		1	071	Highland	**6**	159	Union
		2	073	Hocking	**6**	161	Van Wert
		3	075	Holmes	**2**	163	Vinton
		4	077	Huron	**5**	165	Warren
		1	079	Jackson	**2**	167	Washington
		3	081	Jefferson	**4**	169	Wayne
		6	083	Knox	**6**	171	Williams
		4	085	Lake	**6**	173	Wood
		1	087	Lawrence	**6**	175	Wyandot
42	**PA**	**9**	001	Adams	**9**	071	Lancaster
		5	003	Allegheny	**5**	073	Lawrence
		5	005	Armstrong	**9**	075	Lebanon
		5	007	Beaver	**9**	077	Lehigh
		7	009	Bedford	**8**	079	Luzerne
		9	011	Berks	**6**	081	Lycoming
		7	013	Blair	**6**	083	Mc Kean
		8	015	Bradford	**5**	085	Mercer
		9	017	Bucks	**0**	087	Mifflin
		5	019	Butler	**8**	089	Monroe
		7	021	Cambria	**9**	091	Montgomery
		6	023	Cameron	**8**	093	Montour
		8	025	Carbon	**9**	095	Northampton
		6	027	Centre	**8**	097	Northumberland
		9	029	Chester	**0**	099	Perry
		6	031	Clarion	**9**	101	Philadelphia
		6	033	Clearfield	**8**	103	Pike
		6	035	Clinton	**6**	105	Potter
		8	037	Columbia	**8**	107	Schuylkill
		5	039	Crawford	**0**	109	Snyder
		9	041	Cumberland	**7**	111	Somerset
		0	043	Dauphin	**6**	113	Sullivan
		9	045	Delaware	**8**	115	Susquehanna
		6	047	Elk	**6**	117	Tioga
		5	049	Erie	**0**	119	Union
		7	051	Fayette	**6**	121	Venango
		6	053	Forest	**6**	123	Warren
		0	055	Franklin	**5**	125	Washington
		0	057	Fulton	**8**	127	Wayne
		5	059	Greene	**5**	129	Westmoreland
		0	061	Huntingdon	**8**	131	Wyoming
		5	063	Indiana	**9**	133	York
		6	065	Jefferson	**6**	447	Elk- National Forest
		0	067	Juniata	**6**	453	Forest- National Forest
		8	069	Lackawanna	**6**	483	Mc Kean- National Forest
					6	523	Warren- National Forest
44	**RI**	**1**	001	Bristol	**1**	007	Providence
		1	003	Kent	**1**	009	Washington
		1	005	Newport			

46	**SD**	**1**	003	Aurora	**1**	069	Hyde
		1	005	Beadle	**1**	071	Jackson
		1	007	Bennett	**1**	073	Jerauld
		1	009	Bon Homme	**1**	075	Jones
		1	011	Brookings	**1**	077	Kingsbury
		1	013	Brown	**1**	079	Lake
		1	015	Brule	**2**	081	Lawrence
		1	017	Buffalo	**1**	083	Lincoln
		2	019	Butte	**1**	085	Lyman
		1	021	Campbell	**1**	087	McCook
		1	023	Charles Mi	**1**	089	McPherson
		1	025	Clark	**1**	091	Marshall
		1	027	Clay	**2**	093	Meade
		1	029	Codington	**1**	095	Mellette
		1	031	Corson	**1**	097	Miner
		2	033	Custer	**1**	099	Minnehaha
		1	035	Davison	**1**	101	Moody
		1	037	Day	**2**	103	Pennington
		1	039	Deuel	**1**	105	Perkins
		1	041	Dewey	**1**	107	Potter
		1	043	Douglas	**1**	109	Roberts
		1	045	Edmunds	**1**	111	Sanborn
		2	047	Fall River	**2**	113	Shannon
		1	049	Faulk	**1**	115	Spink
		1	051	Grant	**1**	117	Stanley
		1	053	Gregory	**1**	119	Sully
		1	055	Haakon	**1**	121	Todd
		1	057	Hamlin	**1**	123	Tripp
		1	059	Hand	**1**	125	Turner
		1	061	Hanson	**1**	127	Union
		2	063	Harding	**1**	129	Walworth
		1	065	Hughes	**1**	135	Yankton
		1	067	Hutchinson	**1**	137	Ziebach
50	**VT**	**3**	001	Addison	**2**	015	Lamoille
		3	003	Bennington	**2**	017	Orange
		2	005	Caledonia	**2**	019	Orleans
		3	007	Chittenden	**3**	021	Rutland
		2	009	Essex	**2**	023	Washington
		2	011	Franklin	**3**	025	Windham
		2	013	Grand Isle	**3**	027	Windsor
54	**WV**	**2**	001	Barbour	**2**	065	Morgan
		2	003	Berkeley	**3**	067	Nicholas
		3	005	Boone	**4**	069	Ohio
		2	007	Braxton	**2**	071	Pendleton
		4	009	Brooke	**4**	073	Pleasants
		4	011	Cabell	**2**	075	Pocahontas
		4	013	Calhoun	**2**	077	Preston
		3	015	Clay	**4**	079	Putnam
		4	017	Doddridge	**3**	081	Raleigh
		3	019	Fayette	**2**	083	Randolph
		4	021	Gilmer	**4**	085	Ritchie
		2	023	Grant	**4**	087	Roane
		3	025	Greenbrier	**3**	089	Summers
		2	027	Hampshire	**2**	091	Taylor
		4	029	Hancock	**2**	093	Tucker
		2	031	Hardy	**4**	095	Tyler
		2	033	Harrison	**2**	097	Upshur

		4	035	Jackson	**4**	099	Wayne
		2	037	Jefferson	**2**	101	Webster
		3	039	Kanawha	**4**	103	Wetzel
		2	041	Lewis	**4**	105	Wirt
		4	043	Lincoln	**4**	107	Wood
		3	045	Logan	**3**	109	Wyoming
		3	047	McDowell	**2**	223	Grant- National Forest
		4	049	Marion	**3**	225	Greenbrier- National Forest
		4	051	Marshall	**3**	267	Nicholas- National Forest
		4	053	Mason	**2**	271	Pendleton- National Forest
		3	055	Mercer	**2**	275	Pocahontas- National Forest
		2	057	Mineral	**2**	277	Preston- National Forest
		3	059	Mingo	**2**	283	Randolph- National Forest
		4	061	Monongalia	**2**	293	Tucker- National Forest
		3	063	Monroe	**2**	301	Webster- National Forest
55	**WI**	**3**	001	Adams	**3**	073	Marathon
		2	003	Ashland	**1**	075	Marinette
		2	005	Barron	**3**	077	Marquette
		2	007	Bayfield	**1**	078	Menominee
		5	009	Brown	**5**	079	Milwaukee
		4	011	Buffalo	**3**	081	Monroe
		2	013	Burnett	**1**	083	Oconto
		5	015	Calumet	**1**	085	Oneida
		3	017	Chippewa	**5**	087	Outagamie
		3	019	Clark	**5**	089	Ozaukee
		5	021	Columbia	**4**	091	Pepin
		4	023	Crawford	**4**	093	Pierce
		5	025	Dane	**2**	095	Polk
		5	027	Dodge	**3**	097	Portage
		5	029	Door	**2**	099	Price
		2	031	Douglas	**5**	101	Racine
		4	033	Dunn	**4**	103	Richland
		3	035	Eau Claire	**5**	105	Rock
		1	037	Florence	**2**	107	Rusk
		5	039	Fond du La	**4**	109	St. Croix
		1	041	Forest	**4**	111	Sauk
		4	043	Grant	**2**	113	Sawyer
		5	045	Green	**1**	115	Shawano
		5	047	Green Lake	**5**	117	Sheboygan
		4	049	Iowa	**2**	119	Taylor
		2	051	Iron	**4**	121	Trempealeau
		3	053	Jackson	**4**	123	Vernon
		5	055	Jefferson	**1**	125	Vilas
		3	057	Juneau	**5**	127	Walworth
		5	059	Kenosha	**2**	129	Washburn
		5	061	Kewaunee	**5**	131	Washington
		4	063	La Crosse	**5**	133	Waukesha
		4	065	Lafayette	**3**	135	Waupaca
		1	067	Langlade	**3**	137	Waushara
		1	069	Lincoln	**5**	139	Winnebago
		5	071	Manitowoc	**3**	141	Wood

NRS (East) Note: There are special county codes in PA and WV for some plots on the national forest. “200 or 400” has been added to the county code (e.g., 483). This special identification is no longer used and therefore plots on the national forest may have the 200+ or 400+ designation or retain the normal county code. Whatever the county code is for a national forest plot, do not change this code. Leave the code as is in the field.

Appendix 2+N. FIA Forest Type Codes

NRS Note: The following list includes all forest types in the Continental U.S. – modified for the North. East/West designation indicates types that are commonly found in those regions (East includes NRS and SRS and West incluldes PNW and IW), but may occasionally be found in another.

NRS Note: When determining FOREST TYPE, first try to match the plurality of the stocking present with the "named" type. If the "named" type does not match the plurality of the stocking in the stand, match the plurality of the stocking in the stand with the trees listed as associates under each type even if the "named" type species are not represented in the plurality of the stocking present.

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
			Loblolly / Shortleaf Pine Group
E		161	Loblolly pine
E		162	Shortleaf pine
E		163	Virginia pine
E		165	Table Mountain pine
E		166	Pond pine
E		167	Pitch pine
			Other Eastern Softwoods Group
E		171	Eastern redcedar
			Pinyon / Juniper Group
E	W	182	Rocky Mountain juniper
			Douglas-fir Group
E	W	201	Douglas-fir
			Ponderosa Pine Group
E	W	221	Ponderosa pine
			Exotic Softwoods Group
E		381	Scotch pine
E	W	383	Other exotic softwoods
E		384	Norway spruce

East	West	Code	Species Type
E		385	Introduced larch
			Other Softwoods Group
E	W	391	Other Softwoods
			Oak / Pine Group
E		401	Eastern white pine / N. red oak / white ash
E		402	Eastern redcedar / hardwood
E		404	Shortleaf pine / oak
E		405	Virginia pine / southern red oak
E		406	Loblolly 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		515	Chestnut oak / black oak / scarlet oak
E		516	Cherry / white ash / yellow-poplar
E		517	Elm / Ash / black locust
E		519	Red maple / oak
E		520	Mixed upland hardwoods
			Oak / Gum / Cypress Group
E		601	Swamp chestnut oak / cherrybark oak
E		602	Sweetgum / Nuttall oak / willow oak
E		605	Overcup oak / water hickory
E		606	Atlantic white-cedar
E		607	Baldcypress / water tupelo
E		608	Sweetbay / swamp tupelo / red maple
E		609	Baldcypress / pondcypress
			Elm / Ash / Cottonwood Group
E		701	Black ash / American elm / red maple
E		702	River birch / sycamore
E	W	703	Cottonwood
E	W	704	Willow
E		705	Sycamore / pecan / American elm
E		706	Sugarberry / hackberry / elm / green ash
E		707	Silver maple / American elm
E		708	Red maple / lowland
E	W	709	Cottonwood / willow

East	West	Code	Species Type
			Maple / Beech / Birch Group
E		801	Sugar maple / beech / yellow birch
E		802	Black cherry
E		805	Hard (Sugar) 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
			Exotic Hardwoods Group
E		991	Paulownia
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 marine 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, red 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.

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.

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.

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.

PINYON/JUNIPER GROUP

181 Eastern redcedar- retired, see code 171

DOUGLAS-FIR GROUP

201 Douglas-fir: NRS Note: Sites – unmanaged or abandoned Christmas tree plantations in the North.

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.

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.

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.

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 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.

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 the 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, and 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 baldsypress (either baldcypress or Montezuma baldcypress), Associates – blackgum, willow, red maple, American elm, persimmon, overcup oak, and sweetgum. Sites -- very low, poorly drained flats, deep sloughs, and swamps; wet most all the year. Also, floodplains and stream margins.

608 Sweetbay/swamp tupelo/red maple: Associates – blackgum, Florida maple, water birch, gum bumelia, waterlocust, loblolly bay, all magnolias, red maple, Ogechee tupeolo, redbay, 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 of 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, and hackberry. 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, loblolly pine, white ash, green ash, sycamore, American elm, red maple and boxelder. Sites -- 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.

MAPLE/BEECH/BIRCH GROUP

801 Sugar maple/beech/yellow birch: Associates – butternut, basswood, red maple, hemlock, northern red oak, white ash, white pine, black cherry, sweet birch, American elm, rock elm, and eastern hophornbeam. Sites -- fertile, moist, well-drained sites.

802 Black cherry: Associates – sugar maple, northern red oak, red maple, white ash, basswood, sweet birch, butternut, American elm, and hemlock. Sites -- fertile, moist, well-drained sites.

803 Cherry/ash/yellow-poplar: Retired – see code 516.

805 Hard (Sugar) maple/basswood (includes American, Carolina and white basswood): Associates – black maple, white ash, northern red oak, eastern hophornbeam, American elm, red maple, eastern white pine, eastern hemlock. Sugar maple and basswood occur in different proportions but together comprise the majority of the stocking. Sites -- fertile, moist, well-drained sites.

807 Elm/ash/locust: Retired – see code 517.

809 Red maple/upland: Associates – the type is dominated by red maple and some of the wide variety of northern hardwood associates include sugar maple, beech, birch, aspen, as well as some northern softwoods like white pine, red pine, and hemlock; this type is often the result of repeated disturbance or cutting. Sites -- uplands. (See Type 519 under oak/hickory group)

ASPEN/BIRCH GROUP

901 Aspen: Associates – Engelmann spruce, lodgepole pine, ponderosa pine, Douglas-fir, subalpine fir, white fir, white spruce, balsam poplar, and paper birch. Sites -- aspen has the capacity to grow on a variety of sites and soils, ranging from shallow stony soils and loamy sands to heavy clays.

902 Paper birch (includes northern paper birch): Associates – aspen, white spruce, black spruce, and lodgepole pine. Sites -- can be found on a range of soils, but best developed on well-drained sandy loam and silt loam soils.

903 Gray birch: Associates – oaks, red maple, white pine and others. Sites- poor soils of adandoned farms and burns.
NRS NOTE: Associates – primarily red maple, but including aspen, pin cherry, black cherry, birches (yellow, sweet and paper), white pine, white ash, sugar maple, northern red and white oak. Sites – poor soils that are commonly found on abandoned farms, severe burns, and mining or logged areas. [*Source: Forest Cover Types of the U.S and Canada, 1980]*

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.

EXOTIC HARDWOODS GROUP

991 Paulownia: Stands with the majority of stocking comprised of *Paulownia tomentosa,* commonly know 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 bruned 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.

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+N. FIA Tree Species Codes

This list includes all tree species tallied in the Continental U.S. – modified for the North. Species designated East/West are commonly found in those regions (East includes NRS and SRS and West includes PNW and IW), 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". The North tallies all *CORE* and "Core Optional" species.

NRS Note: Not all tree species are listed in this table that may occur in the North. If not listed, invasive tree species are tallied using species code 0999. The use of code 0999 requires a tree NOTE with the species identified. Dead trees are coded in the following order of identification hierarchy: Species code, Genus code, 0299 or 0998, or 0999.

Core	East	West	Wdlnd	FIA	PLANTS00	Common Name	Genus	Species
	E	W		0010	ABIES	Fir spp.	Abies	spp.
X	E	W		0012	ABBA	balsam fir	Abies	balsamea
X		W		0015	ABCO	white fir	Abies	concolor
X	E			0016	ABFR	Fraser fir	Abies	fraseri
	E	W		0040	CHAMA4	cedar spp.	Chamaecyparis	spp.
X	E			0043	CHTH2	Atlantic white-cedar	Chamaecyparis	thyoides
	E	W		0057	JUNIP	redcedar, juniper spp.	Juniperus	spp.
X	E	W		0061	JUAS	Ashe juniper	Juniperus	ashei
X	E	W	w	0066	JUSC2	Rocky Mountain juniper	Juniperus	scopulorum
X	E			0068	JUVI	eastern redcedar	Juniperus	virginiana
	E	W		0070	LARIX	larch spp.	Larix	spp.
X	E	W		0071	LALA	tamarack (native)	Larix	laricina
	E	W		0090	PICEA	spruce spp.	Picea	spp.
X	E			0091	PIAB	Norway spruce	Picea	abies
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
	E	W		0100	PINUS	pine spp.	Pinus	spp.
X	E			0105	PIBA2	jack pine	Pinus	banksiana
X		W		0108	PICO	lodgepole pine	Pinus	contorta
X	E			0110	PIEC2	shortleaf pine	Pinus	echinata
X		W		0113	PIFL2	limber pine	Pinus	flexilis
X	E	W		0122	PIPO	ponderosa pine	Pinus	ponderosa
X	E			0123	PIPU5	Table Mountain pine	Pinus	pungens
X	E			0125	PIRE	red pine	Pinus	resinosa

Core	East	West	Wdlnd	FIA	PLANTS00	Common Name	Genus	Species
X	E			0126	PIRI	pitch pine	Pinus	rigida
X	E			0128	PISE	pond pine	Pinus	serotina
X	E			0129	PIST	eastern white pine	Pinus	strobus
X	E			0130	PISY	Scotch pine	Pinus	sylvestris
X	E			0131	PITA	loblolly pine	Pinus	taeda
X	E			0132	PIVI2	Virginia pine	Pinus	virginiana
X	E			0136	PINI	Austrian pine	Pinus	nigra
		W		0200	PSEUD7	Douglas-fir spp.	Pseudotsuga	spp.
X		W		0202	PSME	Douglas-fir	Pseudotsuga	menziesii
	E			0220	TAXOD	cypress spp.	Taxodium	spp.
X	E			0221	TADI2	baldcypress	Taxodium	distichum
X	E			0222	TAAS	pondcypress	Taxodium	ascendens
	E	W		0230	TAXUS	yew spp.	Taxus	spp.
	E	W		0240	THUJA	Thuja spp.	Thuja	spp.
X	E			0241	THOC2	northern white-cedar	Thuja	occidentalis
	E	W		0260	TSUGA	hemlock spp.	Tsuga	spp.
X	E			0261	TSCA	eastern hemlock	Tsuga	canadensis
X	E	W		0299	2TE	unknown dead conifer	Tree	evergreen
	E	W		0310	ACER	maple spp.	Acer	spp.
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
	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		0334	AEGLA	Texas buckeye	Aesculus	glabra var. arguta
	E			0336	AEPA	red buckeye	Aesculus	pavia
X	E			0341	AIAL	ailanthus	Ailanthus	altissima
X	E	W		0345	ALJU	mimosa/silktree	Albizia	julibrissin

Core	East	West	Wdlnd	FIA	PLANTS00	Common Name	Genus	Species
		W		0350	ALNUS	alder spp.	Alnus	spp.
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
X	E			0367	ASTR	pawpaw	Asimina	triloba
	E	W		0370	BETUL	birch spp.	Betula	spp.
X	E			0371	BEAL2	yellow birch	Betula	alleghaniensis
X	E			0372	BELE	sweet birch	Betula	lenta
X	E			0373	BENI	river birch	Betula	nigra
X	E			0374	BEOC2	water birch	Betula	occidentalis
X	E	W		0375	BEPA	paper birch	Betula	papyrifera
X	E			0379	BEPO	gray birch	Betula	populifolia
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			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			0412	CAOV3	red hickory	Carya	ovalis
	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
	E			0450	CATAL	catalpa spp.	Catalpa	spp.
X	E			0451	CABI8	southern catalpa	Catalpa	bignonioides
X	E			0452	CASP8	northern catalpa	Catalpa	speciosa
	E	W		0460	CELTI	hackberry spp.	Celtis	spp.

Core	East	West	Wdlnd	FIA	PLANTS00	Common Name	Genus	Species
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
X	E			0481	CLKE	yellowwood	Cladrastis	kentukea
	E	W		0490	CORNU	dogwood spp.	Cornus	spp.
X	E			0491	COFL2	flowering dogwood	Cornus	florida
	E			0500	CRATA	hawthorn spp.	Crataegus	spp.
	E			0501	CRCR2	cockspur hawthorn	Crataegus	crus-galli
	E			0502	CRMO2	downy hawthorn	Crataegus	mollis
	E			0503	CRBR3	Brainerd hawthorn	Crataegus	brainerdii
	E			0504	CRCA	pear hawthorn	Crataegus	calpodendron
	E			0505	CRCH	fireberry hawthorn	Crataegus	chrysocarpa
	E			0506	CRDI	broadleaf hawthorn	Crataegus	dilatata
	E			0507	CRFL	fanleaf hawthorn	Crataegus	flabellata
	E			0508	CRMO3	oneseed hawthorn	Crataegus	monogyna
	E			0509	CRPE	scarlet hawthorn	Crataegus	pedicellata
	E			5091	CRPH	Washington hawthorn	Crataegus	phaenopyrum
	E			5092	CRSU5	fleshy hawthorn	Crataegus	succulenta
	E			5093	CRUN	dwarf hawthorn	Crataegus	uniflora
	E			0520	DIOSP	persimmon spp.	Diospyros	spp.
X	E			0521	DIVI5	common persimmon	Diospyros	virginiana
X	E			0531	FAGR	American beech	Fagus	grandifolia
	E	W		0540	FRAXI	ash spp.	Fraxinus	spp.
X	E			0541	FRAM2	white ash	Fraxinus	americana
X	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
	E			0550	GLEDI	locust spp.	Gleditsia	spp.
X	E			0551	GLAQ	waterlocust	Gleditsia	aquatica
X	E			0552	GLTR	honeylocust	Gleditsia	triacanthos
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.

Core	East	West	Wdlnd	FIA	PLANTS00	Common Name	Genus	Species
X	E			0591	ILOP	American holly	Ilex	opaca
	E	W		0600	JUGLA	walnut spp.	Juglans	spp.
X	E			0601	JUCI	butternut	Juglans	cinerea
X	E	W		0602	JUNI	black walnut	Juglans	nigra
	E	W		0605	JUMI	Texas walnut	Juglans	microcarpa
X	E			0611	LIST2	sweetgum	Liquidambar	styraciflua
X	E			0621	LITU	yellow-poplar	Liriodendron	tulipifera
X	E			0641	MAPO	Osage-orange	Maclura	pomifera
	E			0650	MAGNO	magnolia spp.	Magnolia	spp.
X	E			0651	MAAC	cucumbertree	Magnolia	acuminata
X	E			0652	MAGR4	southern magnolia	Magnolia	grandiflora
X	E			0653	MAVI2	sweetbay	Magnolia	virginiana
X	E			0654	MAMA2	bigleaf magnolia	Magnolia	macrophylla
X	E			0655	MAFR	mountain magnolia, Fraser magnolia	Magnolia	fraseri
X	E			0658	MATR	umbrella magnolia	Magnolia	tripetala
	E	W		0660	MALUS	apple spp.	Malus	spp.
X	E			0662	MAAN3	southern crabapple	Malus	angustifolia
X	E			0663	MACO5	sweet crabapple	Malus	coronaria
X	E			0664	MAIO	prairie crabapple	Malus	ioensis
	E			0680	MORUS	mulberry spp.	Morus	spp.
X	E			0681	MOAL	white mulberry	Morus	alba
X	E			0682	MORU2	red mulberry	Morus	rubra
X	E			0684	MONI	black mulberry	Morus	nigra
	E			0690	NYSSA	tupelo spp.	Nyssa	spp.
X	E			0691	NYAQ2	water tupelo	Nyssa	aquatica
X	E			0693	NYSY	blackgum	Nyssa	sylvatica
X	E			0694	NYBI	swamp tupelo	Nyssa	biflora
X	E			0701	OSVI	eastern hophornbeam	Ostrya	virginiana
X	E			0711	OXAR	sourwood	Oxydendrum	arboreum
X	E			0712	PATO2	paulownia, empress-tree	Paulownia	tomentosa
	E	W		0720	PERSE	bay spp.	Persea	spp.
X	E			0722	PLAQ	water-elm, planertree	Planera	aquatica
	E	W		0729	PLATA	sycamore spp.	Platanus	spp.
X	E			0731	PLOC	American sycamore	Platanus	occidentalis

Core	East	West	Wdlnd	FIA	PLANTS00	Common Name	Genus	Species
	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		0749	POAN3	narrowleaf cottonwood	Populus	angustifolia
X	E			0752	POAL7	silver poplar	Populus	alba
X	E			0753	PONI	Lombardy poplar	Populus	nigra
	E	W		0760	PRUNU	cherry and plum spp.	Prunus	spp.
	E	W		0761	PRPE2	pin cherry	Prunus	pensylvanica
X	E			0762	PRSE2	black cherry	Prunus	serotina
	E	W		0763	PRVI	common chokecherry	Prunus	virginiana
	E			0764	PRPE3	peach	Prunus	persica
X	E			0765	PRNI	Canada plum	Prunus	nigra
X	E			0766	PRAM	American plum	Prunus	americana
	E			0769	PRAL5	Allegheny plum	Prunus	alleghaniensis
	E	W		0770	PRAN3	Chickasaw plum	Prunus	angustifolia
X	E			0771	PRAV	sweet cherry (domesticated)	Prunus	avium
	E			0772	PRCE	sour cherry (domesticated)	Prunus	cerasus
	E			0773	PRDO	European plum (domesticated)	Prunus	domestica
	E			0774	PRMA	Mahaleb plum (domesticated)	Prunus	mahaleb
	E	W		0800	QUERC	oak – deciduous spp.	Quercus	spp.
X	E			0802	QUAL	white oak	Quercus	alba
X	E			0804	QUBI	swamp white oak	Quercus	bicolor
X	E			0806	QUCO2	scarlet oak	Quercus	coccinea
X	E			0809	QUEL	northern pin oak	Quercus	ellipsoidalis
X	E			0812	QUFA	southern red oak	Quercus	falcata
X	E			0813	QUPA5	cherrybark oak	Quercus	pagoda

Core	East	West	Wdlnd	FIA	PLANTS00	Common Name	Genus	Species
X	E			0816	QUIL	scrub oak	Quercus	ilicifolia
X	E			0817	QUIM	shingle oak	Quercus	imbricaria
X	E			0820	QULA3	laurel oak	Quercus	laurifolia
X	E			0822	QULY	overcup oak	Quercus	lyrata
X	E			0823	QUMA2	bur oak	Quercus	macrocarpa
X	E			0824	QUMA3	blackjack oak	Quercus	marilandica
X	E			0825	QUMI	swamp chestnut oak	Quercus	michauxii
X	E			0826	QUMU	chinkapin oak	Quercus	muehlenbergii
X	E			0827	QUNI	water oak	Quercus	nigra
X	E			0828	QUBU2	Nuttall oak	Quercus	buckleyi
X	E			0830	QUPA2	pin oak	Quercus	palustris
X	E			0831	QUPH	willow oak	Quercus	phellos
X	E			0832	QUPR2	chestnut oak	Quercus	prinus
X	E			0833	QURU	northern red oak	Quercus	rubra
X	E			0834	QUSH	Shumard's oak	Quercus	shumardii
X	E			0835	QUST	post oak	Quercus	stellata
X	E			0837	QUVE	black oak	Quercus	velutina
X	E			0840	QUMA6	dwarf post oak	Quercus	margarettiae
	E			0845	QUPR	dwarf chinkapin oak	Quercus	prinoides
X	E	W		0901	ROPS	black locust	Robinia	pseudoacacia
	E	W		0919	SASAD	western soapberry	Sapindus	saponaria var. drummondii
	E	W		0920	SALIX	willow spp.	Salix	spp.
	E	W		0921	SAAM2	peachleaf willow	Salix	amygdaloides
	E	W		0922	SANI	black willow	Salix	nigra
	E	W		0923	SABE2	Bebb willow	Salix	bebbiana
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
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			0950	TILIA	basswood spp.	Tilia	spp.

Core	East	West	Wdlnd	FIA	PLANTS00	Common Name	Genus	Species
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
	E	W		0991	TAMAR2	saltcedar	Tamarix	spp.
X	E			0993	MEAZ	chinaberry	Melia	azedarach
X	E			0996	COOB2	smoketree	Cotinus	obovatus
	E	W		0997	ELAN	Russian-olive	Elaeagnus	angustifolia
X	E	W		0998	2TB	unknown dead hardwood	Tree	broadleaf
X	E	W		0999	2TREE	other, or unknown live tree	Tree	unknown

Appendix 4+N. Site Tree Selection Criteria and Species List

NRS Note: Refer to Section 7 of this Field Guide for the complete guidelines on collecting Site Index data.

A. Eastern U.S. Site-Tree Selection Criteria modified for the North

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:

NRS Note: Site index trees that are 5.0" DBH and larger should be selected if available. If no site index trees are available 5.0" DBH or larger then trees from 3.0" DBH - 4.9" DBH should be selected. Trees used for Site Index that are under 5.0" DBH will need to be re-input as a new tree at time of next inventory with next available Tree Record Number. Do not select trees less than 3.0" DBH. Site trees should be at least 20 years old actual age. Actual Age can be calculated by adding "Add Years" to DBH age. The "Add Years" can be found in the Site Index Curves booklet. If no suitable site index trees 20 years actual age or older are available, then trees 15 - 19 years old actual age can be selected. Site trees should be less than 120 years old actual age. If no suitable site index trees 120 years old actual age and less are available then trees 200 years old actual age and less can be selected. The Legal files are set at 10 to 200.

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.

NRS Note: The species table below has been modified for the Northern region. Species indicated with an "E" are acceptable to core in the eastern states. Species indicated with a "W" are acceptable to core in the western states. "East" is defined as Ohio and West Virginia and all NRS states east; "West" is defined as Michigan and Indiana and all NRS states west.

Code	Common Name	NRS	
0012	balsam fir	E	W
0043	Atlantic white-cedar	E	
0068	eastern redcedar	E	W
0070	larch (introduced)	E	
0071	tamarack (native)	E	W
0094	white spruce	E	W
0095	black spruce	E	W
0097	red spruce	E	
0105	jack pine	E	W
0110	shortleaf pine	E	W
0122	Ponderosa pine		W
0125	red pine	E	W
0128	pond pine	E	
0129	eastern white pine	E	W
0130	Scotch pine	E	W

Code	Common Name	NRS	
0131	loblolly pine	E	
0132	Virginia pine	E	
0241	northern white cedar	E	W
0261	eastern hemlock	E	W
0316	red maple	E	W
0317	silver maple	E	W
0318	sugar maple	E	W
0371	yellow birch	E	W
0375	paper birch	E	W
0402	bitternut hickory	E	W
0403	pignut hickory		W
0404	pecan		W
0405	Shellbark hickory		W
0407	shagbark hickory	E	W
0408	black hickory		W
0409	mockernut hickory		W
0462	hackberry		W
0531	American beech	E	W
0541	white ash	E	W
0543	black ash	E	W
0544	green ash	E	W
0611	sweetgum	E	W
0621	yellow-poplar	E	W
0741	balsam poplar		W
0742	eastern cottonwood	E	W
0743	bigtooth aspen	E	W
0746	quaking aspen	E	W
0762	black cherry		W
0802	white oak	E	W
0806	scarlet oak	E	W
0809	northern pin oak		W
0812	southern red oak	E	
0813	cherrybark oak	E	
0817	shingle oak	E	W
0823	bur oak		W
0827	water oak	E	
0830	pin oak	E	W
0832	chestnut oak	E	
0833	northern red oak	E	W
0835	post oak	E	W
0837	black oak	E	W
0901	black locust	E	W
0951	American basswood	E	W
0972	American elm	E	W
0975	slippery elm		W
0977	rock elm		W

NRS Note: The species table below is unmidified from the national text. It is only to be used for reference.

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
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

Code	Common Name	Region
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+N. 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).

NRS Note: For pasture or range where there is mowing (i.e., brush hogging to control regeneration of trees and shrubs; not for recreation or yard maintenance) or intensive grazing, stocking must be at least 10% by trees > 1.0 inch DBH. If this factor is met for stocking, the plot is given CONDITION CLASS STATUS 1 and the plot is installed.

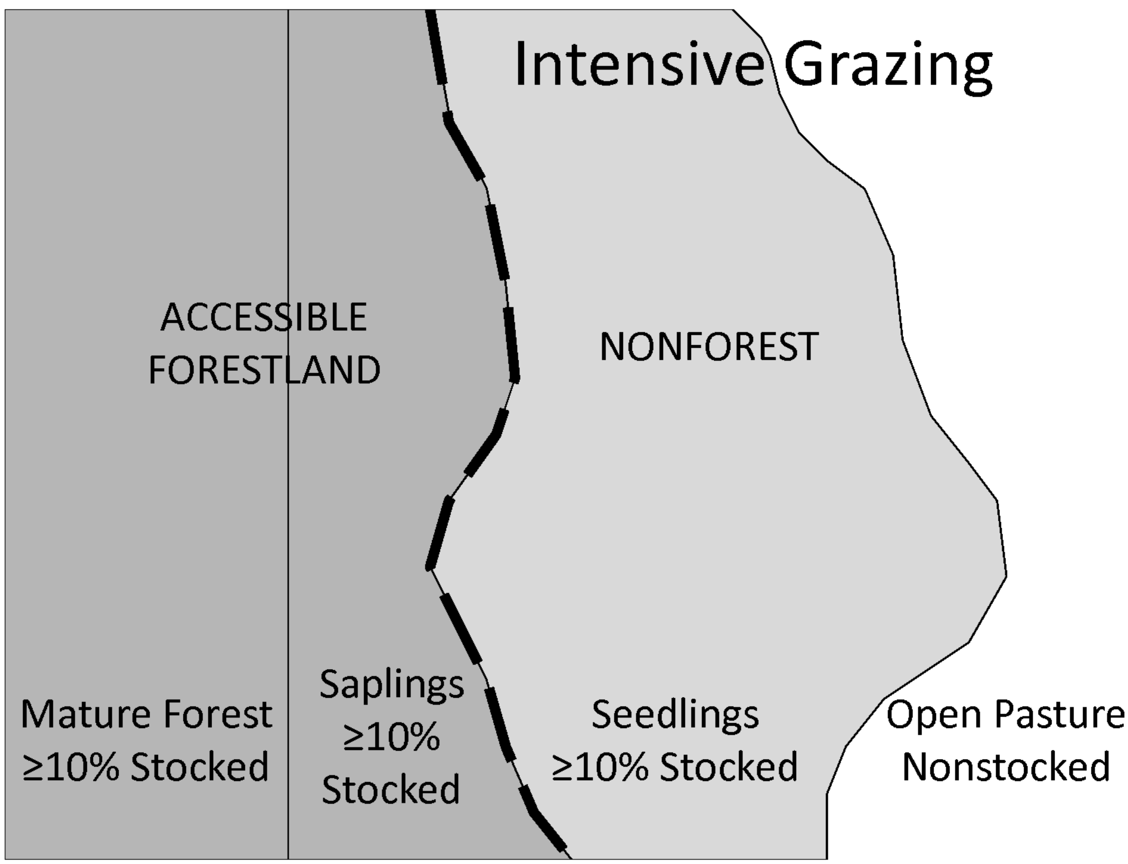


Figure 41.1N. Zones between nonstocked pasture and defined Forestland that reach 10 % stocking by stems > 1.0 inch DBH are grouped with Forestland. Zones that require seedlings and stems > 1.0 inch DBH to meet 10% stocking are grouped with Pasture.

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 live trees on the plot (i.e., all 4 subplots and/or temporary subplots) 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. In the NRS, use the *Stocking Values* table to determine if the condition meets minimum stocking, use table 5a plus 5b.

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. If a species is not listed, use the unknown code 0999 value. 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: 5^{th} row, 1^{st} 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.

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 are 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.

How to Install Stocking Subplots << Additional Regional Instructions

If it is unclear if a particular condition will meet the minimum stocking levels required for CONDITION CLASS STATUS = 1 (accessible forest land), the following procedures are used to determine the stocking level.

1. To determine if minimum stocking is reached, the crew samples all live trees on each of the four 1/24 acre subplots (tree tally), and the four 1/300 acre reproduction plots (seedling and sapling tally) located 90 degrees and 12.0 feet from the subplot centers. The sample may consist of any combination of regular subplots and/or temporary subplots, provided all subplots fall entirely in the questionable condition.

2. The crew installs temporary subplots as necessary to yield four 1/24 acre sample areas. Use the Stocking Plot Reference Diagram showing the temporary subplot layout relative to the actual plot location. (See Figure A5.1N, A5.2N and A5.3N for illustrated examples.)

   a. Begin by locating the temporary subplots off 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 temporary subplots are located in the following order: 1) 120.0 feet at 360 degrees, 2) 120.0 feet and 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 temporary 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 temporary subplot off the other temporary subplots in the order they were installed until 4 subplots have been located in the questionable condition. (See Figure A5.3N for illustrated example.)

3. If any time, the tally indicates that minimum stocking levels have been met, do not install the remaining temporary subplots. Note: Crew may need to install all 4 subplots and/or temporary subplots to identify the largest tree on the plot so that the correct stocking values can be obtained from the tables.

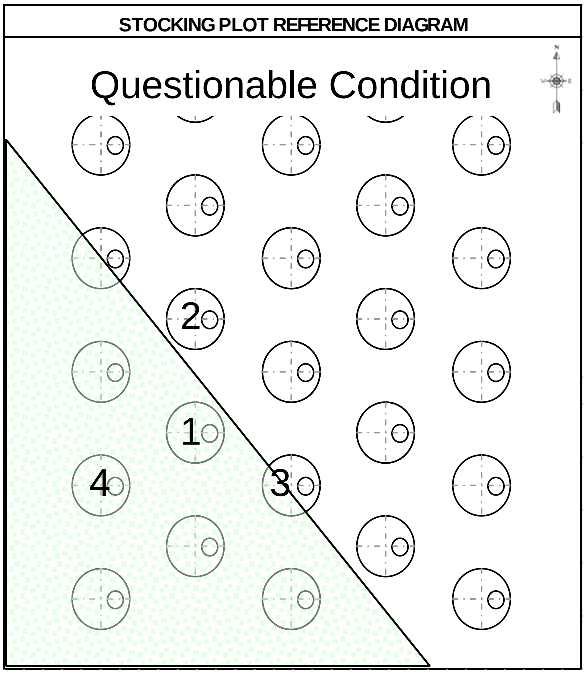


Figure A5.1N. **In this illustration a plot straddles a forest and a questionable condition. Subplots 1 and 4 are entirely in forest. Subplot 3 straddles the conditions and subplot 2 falls entirely in the questionable condition. Since subplot 3 is the "highest" numbered normal subplot in the questionable condition, temporary subplots are first installed from this subplot. See Figure A5.2.**

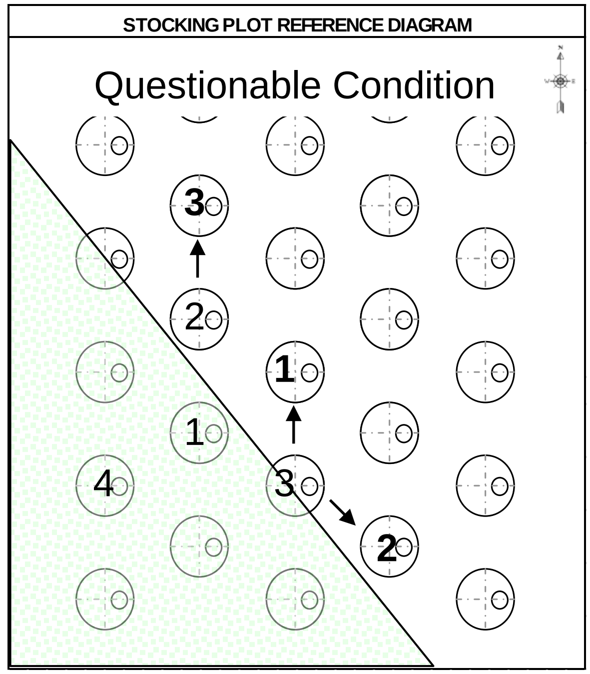


Figure A5.2N. **The illustration shows the temporary subplot installation sequence from the original subplot 3. The 1st temporary subplot is installed at 360 degrees and the 2nd temporary subplot is installed at 120 degrees. The 3rd temporary subplot is installed from original subplot 2. Since original subplot 2 falls in the questionable condition, this subplot and the 3 temporary subplots are used to determine stocking.**

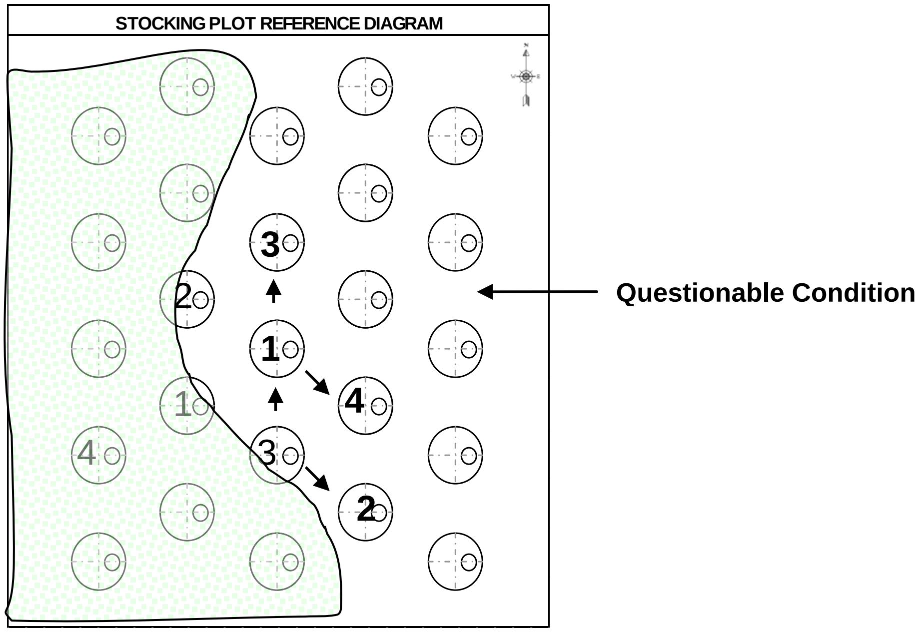


Figure A5.3N. This illustration shows how to install temporary subplots from temporary subplots. Original subplot 3 is the highest numbered normal subplot in the questionable condition. From subplot 3, 2 temporary subplots can be installed at 360 and 120 degrees. The next highest normal subplot in the questionable condition is 2, but no temporary subplots can be installed from this subplot. Temporary subplot 3 and 4 are installed from the 1st temporary subplot installed.

NRS Note: On the following page, the use of a regional Stocking Check Worksheet is described and illustrated. The use of the worksheet and the Stocking Plot Reference Diagram documents the procedures used to verify whether or not a questionable condition met minimum stocking for accessible forest land. This worksheet and diagram is attached to any plot where stocking is checked.

STOCKING CHECK WORKSHEET						
DBH of the largest tally tree on the plot = 03.2						
Column used from Table 5a + 5b: 3.0-3.9						
SUBPLOT NUMBER	PLOT TYPE	SPECIES	DBH	NUMBER TALLIED BY DBH SIZE CLASS	STOCKING VALUE	CUMULATIVE TOTAL
x	x	xxxx	xxx	x	xx.x	xx.x
1'	2	0611	032	1	7.6	7.6
2'	2	0068	001	1	2.3	9.9
3'	2	0316	001	3	2.4	17.1

Figure A5.4N. Determine the largest tree on the 4 subplots and/or temporary subplots used for stocking. This diameter determines the stocking value column used from Table 5a or 5b. Find the species and go across the table to the appropriate diameter column and record this value. The "largest diameter tree" is the first stocking value entered in the stocking check worksheet. In this example the largest tree on the 4 subplots was on temporary subplot 1's microplot. Additional tally on the temporary subplots were required to finish the stocking check.

STOCKING CHECK WORKSHEET						
DBH of the largest tally tree on the plot = 07.1						
Column used from Table 5a + 5b: 5.0+						
SUBPLOT NUMBER	PLOT TYPE	SPECIES	DBH	NUMBER TALLIED BY DBH SIZE CLASS	STOCKING VALUE	CUMULATIVE TOTAL
x	x	xxxx	xxx	x	xx.x	xx.x
1'	1	0129	071	1	1.2	1.2
2'	2	0068	001	3	1.6	6.0
3'	2	0316	001	3	1.6	10.8

Figure A5.5. This example of using the stocking worksheet uses the same species and count from the Figure A5.4. However, a different column is used because now the largest tree is 7.1 inches on the plot and not 3.2.

Table 5a. Stocking values for all tallied trees on the four subplots and microplots modified for the North's species list.

	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**		**Seed-ling**
	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**	**Seed-ling**	**Seed-ling**
10, 12, 16, 70, 71, 90, 91, 94, 96, 97	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
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
68, 105, 123, 126, 130, 132, 230,	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
66, 100, 113, 122, 321, 800, 823, 826	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
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, 202	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	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
40	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

Table 5a. Stocking values for all tallied trees on the four subplots and microplots modified for the North's species list.

	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**		**Seed-ling**
	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**	**Seed-ling**	**Seed-ling**
310, 316, 317, 319, 320, 341, 356, 357, 358, 367, 391, 420, 421, 424, 471, 481, 490, 491, 550, 551, 561, 571, 580, 583, 591, 653, 680, 681, 682, 684, 701, 711, 760, 761, 763, 764, 765, 766, 769, 770, 771, 772, 773, 774, 919, 920, 921, 922, 923, 925, 926, 927, 929, 934, 935, 936, 937, 991, 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
350, 355	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, 336, 370, 371, 372, 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, 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

Table 5a. Stocking values for all tallied trees on the four subplots and microplots modified for the North's species list.

	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**		**Seed-ling**
	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**	**Seed-ling**	**Seed-ling**
400, 401, 402, 403, 404, 405, 407, 408, 409, 410, 412, 422, 423, 500, 501, 502, 503, 504, 505, 506, 507, 508, 509, 520, 521, 641, 660, 662, 663, 664, 802, 804, 806, 808, 809, 812, 813, 816, 817, 820, 822, 824, 825, 827, 828, 830, 831, 832, 833, 834, 835, 837, 840, 845, 901, 931, 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
600, 601, 602, 605	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, 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

Table 5a. Stocking values for all tallied trees on the four subplots and microplots modified for the North's species list.

	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**		**Seed-ling**
	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**	**Seed-ling**	**Seed-ling**
540, 541, 543, 545, 546, 621, 650, 651, 652, 654, 655, 658, 720, 722, 762, 993	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, 731, 740, 742, 744, 745, 747, 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 modified for the North's species list.

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, 70, 71, 90, 91, 94, 96, 97	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
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
68, 105, 123, 126, 130, 132, 230,	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
66, 100, 113, 122, 321, 800, 823, 826	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, 202	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	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
40	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
310, 316, 317, 319, 320, 341, 356, 357, 358, 367, 391, 420, 421, 424, 471, 481, 490, 491, 550, 551, 561, 571, 580, 583, 591, 653, 680, 681, 682, 684, 701, 711, 760, 761, 763, 764, 765, 766, 769, 770, 771, 772, 773, 774, 919, 920, 921, 922, 923, 925, 926, 927, 929, 934, 935, 936, 937, 991, 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, 355	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, 336, 370, 371, 372, 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, 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

Table 5b. Stocking values for all trees tallied on the subplot only modified for the North's species list.

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+
400, 401, 402, 403, 404, 405, 407, 408, 409, 410, 412, 422, 423, 500, 501, 502, 503, 504, 505, 506, 507, 508, 509, 520, 521, 641, 660, 662, 663, 664, 802, 804, 806, 808, 809, 812, 813, 816, 817, 820, 822, 824, 825, 827, 828, 830, 831, 832, 833, 834, 835, 837, 840, 845, 901, 931, 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, 605	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, 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, 543, 545, 546, 621, 650, 651, 652, 654, 655, 658, 720, 722, 762, 993	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, 731, 740, 742, 744, 745, 747, 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

ST	UNIT	CNTY	PLOT #
xx	x	xxx	xxxx

STOCKING CHECK WORKSHEET

DBH of the largest tally tree on the plot =

Column used from Table 5a + 5b:

SUBPLOT NUMBER	PLOT TYPE	SPECIES	DBH	NUMBER TALLIED BY DBH SIZE CLASS	STOCKING VALUE	CUMULATIVE TOTAL
x	x	xxxx	xx.x	x	xx.x	xx.x
		0				
		0				
		0				
		0				
		0				

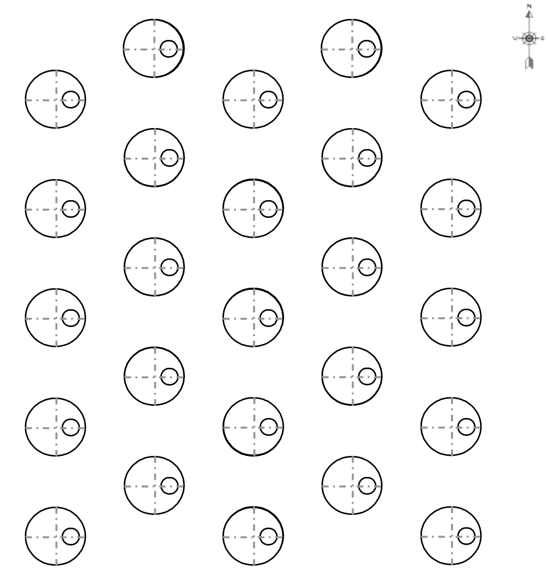
STOCKING CHECK WORKSHEET

DBH of the largest tally tree on the plot =

Column used from Table 5a + 5b:

SUBPLOT NUMBER	PLOT TYPE	SPECIES	DBH	NUMBER TALLIED BY DBH SIZE CLASS	STOCKING VALUE	CUMULATIVE TOTAL
x	x	xxxx	xx.x	x	xx.x	xx.x
		0				
		0				
		0				
		0				
		0				

STOCKING PLOT REFERENCE DIAGRAM



STOCKING PLOT NOTES:

Appendix 6+N. Glossary

"Two-inch Rule" – Take the current DBH minus two-inches on a poletimber size tree. This calculated diameter is used to determine the potential Top DOB of the future sawlog length when the tree becomes sawtimber-size. Once the potential Top DOB is determined, the tree must maintain this diameter for at least the length of a potential sawlog to receive a TREE CLASS 2, Growing Stock.

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.

Bay forests – These forests are restricted to coastal depressions or floodplains where saturated conditions prevail. Surface flooding is common, but usually not persistent. They occur exclusively in the Coastal Plain Physiographic province, and range from Maryland to southeast Texas.

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.

Bogs – Peatlands usually lacking an overlaying layer of mineral soils. They occur primarily in formerly glaciated areas of the northeastern U.S., the north-central states, and Canada and often develop in deep glaciated lakes. Bogs are characterized by evergreen trees and shrubs and are often covered with sphagnum moss.

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.

Carolina bays – Elliptical depressions of the southeastern Coastal Plain which are consistently oriented in a northwest-southeast direction and many of which contain shrub bog communities. They occur predominately in the coastal areas of South Carolina and in southeastern North Carolina.

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.

Clear-cut – The cutting of all merchantable trees from an area. Often leaves a large number of unsalable trees.

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.

Conservation easement – A conservation easement is a restriction placed on a piece of property to protect its associated resources. The easement is either voluntarily donated or sold by the landowner and constitutes a legally binding agreement that limits certain types of uses or prevents development from taking place on the land in perpetuity while the land remains in private hands. A conservation easement is legally binding, whether the property is sold or passed on to heirs. *[Source: nature.org]*

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).

Fens – A type of peatland which resemble bogs. However, fens support marsh-like vegetation including sedges and wildflowers. The main differences between fens and bogs are in flora, hydrology and water chemistry. Fens, like bogs, tend to occur in glaciated areas of the northern United States. *[Source: www.aquatic.uoguelph.ca and EPA 843-F-01-002b]*

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.

Legal Description – A legal description is used to describe the location of land in legal documents. The Land Ordinance of 1785 devised a system base lines and meridian lines using to survey the western lands outside the initial 13 colonies. Base lines run east/west and meridian lines run north/south. Along these lines the land was divided into 6 square mile blocks, called "Townships". Each Township is given an identifying number, according to where it falls. The east/west numbers are identified by the term "Range" and the north/south numbers are identified by the term "Township". Each township is divided into 36 square-mile parcels of 640 acres, called "Sections". Every section is numbered from 1 to 36, depending upon its position within the township. A section can be further divided into halves, quarters, etc. *[Source: http://www.csuchico.edu/lbib/maps/townships.html]*

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. Marshes are separated into freshwater and saltwater types. Freshwater marshes are primarily inland, while salt marshes line the coasts of North America. *[Source: www.aquatic.uoguelph.ca]*

Meadows – Wet meadows are herb-dominated areas saturated for long periods during the growing season, but are seldom flooded. Some sedge meadows may have standing surface water and look more marsh-like in appearance. Wet meadows are often associated with agricultural lands, especially pastures. Wet meadows commonly occur in poorly drained areas such as shallow lake basins, low-lying depressions, and the land between shallow marshes and upland areas. Precipitation serves as their primary water supply, so they are often dry in the summer. *[Source: Tiner and EPA 843-F-01-002b]*

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.

Pocosins – The word pocosin comes from the Algonquin Native American word for "swamp on a hill". These evergreen shrub and tree dominated landscapes are found on the Atlantic Coastal Plain from Virginia to northern Florida, though most are found in North Carolina. Usually, there is no standing water present in pocosins, but a shallow water table leaves the soil saturated for much of the year. They range in size from less than an acre to several thousand acres located between and isolated from old or existing stream systems in most instances. *[Source: www.epa.gov/owow/wetlands/types/]*

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.

Swamps – Wet areas dominated by woody shrubs and trees, some with hardwoods such as red maple and ashes and others with softwoods like cedar and spruce. Willows, alders, shrubby dogwoods, and buttonbush dominate shrub swamps. Some shrub swamps are permanent, while others slowly transform to forested swamps.

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.

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

Appendix 7+N. 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.

NRS Note: Regional rows are shaded. This table does not reflect tolerances that have been tightened regionally.

NRS Note: Light gray text indicates national data items we do not collect in the North

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				
CYCLE	n/a	n/a	n/a/	n/a
SUB-CYCLE	n/a	n/a	n/a	n/a
STATE	No errors	at least 99% of the time	Appendix 1	n/a
UNIT	No errors	at least 99% of the time	0 TO 9	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
PHASE	n/a	n/a	n/a	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
PREVIOUS YEAR	n/a	n/a	n/a	n/a
PREVIOUS MONTH	n/a	n/a	n/a	n/a
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

Variable Name	Tolerance	MQO†	Values	Units
1 OR 2 PERSON PLOT	n/a	n/a	1, 2	n/a
PLOT SEASON	n/a	n/a	1 to 3	
TRAINING PLOT	n/a	n/a	0, 1	
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
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

Variable Name	Tolerance	MQO†	Values	Units
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
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
GPS PDOP	No errors	at least 90% of the time	0.0 to 8.0	n/a
NUMBER OF READINGS	No errors	at least 99% of the time	001 to 999	n/a

Variable Name	Tolerance	MQO[†]	Values	Units
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
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

Variable Name	Tolerance	MQO†	Values	Units
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
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

Variable Name	Tolerance	MQO†	Values	Units
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
STAND STRUCTURE	No errors	at least 90% of the time	1 to 5	n/a
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
PRODUCTIVITY STATUS	No errors	at least 99% of the time	0, 1	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
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
NONFOREST TREE	No errors	at least 99% of the time	1, 2	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

Variable Name	Tolerance	MQO†	Values	Units
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
CROWN CLOSURE	No errors	at least 99% of the time		
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
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
PERCENT AREA	n/a	n/a	1 to 100	Pct.
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

Variable Name	Tolerance	MQO†	Values	Units
PREVIOUS TREE STATUS	No errors	at least 95% of the time	1, 2	n/a
PRESENT TREE STATUS	No errors	at least 95% of the time	0 to 3	n/a
RECONCILE	No errors	at least 95% of the time	1 to 4: valid for new trees on the plot 5 to 9: valid for remeasured trees that no longer qualify as tally	n/a
STANDING DEAD	No errors	At least 99% of the time	0, 1	n/a
MORTALITY	*No errors*	*at least 85% of the time*	*0, 1*	*n/a*
SPECIES	No errors	at least 99% of the time for genus at least 95% of the time for species	Appendix 3	n/a
DIAMETER	+/- 0.1 inch per 20.0 inch increment of measured diameter on all live trees and dead trees with DECAY CLASS = 1, 2 +/-1.0 inch per 20.0 inch increment of measured diameter on dead trees with DECAY CLASS = 3, 4, 5 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
TREE CLASS	No errors	at least 90% of the time	2 to 6	n/a
TREE GRADE	No errors	at least 90% of the time	1 to 5	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

Variable Name	Tolerance	MQO†	Values	Units
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 AGENTS STANDARD	No errors	at least 80% of the time	See 5.20.7N	n/a
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
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
SHRUB SUBPLOT NO.	No errors	at least 99% of the time	1 to 4	n/a

Variable Name	Tolerance	MQO†	Values	Units
SHRUB AND VINE SPECIES	No errors	at least 90% of the time	See Appendix D	n/a
CONDITION CLASS NO.	No errors	at least 99% of the time	1 to 9	n/a
SHRUB COUNT	No errors for 5 or less per species +/-20% over a count of 5	at least 90% of the time	01 to 50	n/a
Site Tree Information				
TREE RECORD NUMBER	No errors	at least 99% of the time	001 to 999	n/a
CONDITION CLASS LIST	No errors	at least 99% of the time	1000 to 9876	n/a
SPECIES	No errors	at least 99% of the time for genus at least 95% of the time for species	Appendix 3	n/a
DIAMETER	+/- 0.1 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				

Variable Name	Tolerance	MQO†	Values	Units
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*
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*

Variable Name	Tolerance	MQO†	Values	Units
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*
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*

Variable Name	Tolerance	MQO[†]	Values	Units
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*
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*

Variable Name	Tolerance	MQO†	Values	Units
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*
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*

Variable Name	Tolerance	MQO†	Values	Units
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*
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*

Variable Name	Tolerance	MQO†	Values	Units
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
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

Variable Name	Tolerance	MQO†	Values	Units
INVASIVE PLANT NOTES	n/a	n/a	English language words, phrases, and numbers	n/a

†MQOs are based on population estimates and do not apply to individual variables at the plot level.

Appendix 8+N. 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		1	
SAMPLE KIND 2 (Remeasure)						
Live 5.0+ DBH/DRC	Live 5.0+ DBH/DRC	1	1			
Live 1.0-4.9 DBH/DRC on microplot	Live 5.0+ DBH	1	1			
Live 1.0-4.9 DBH/DRC on microplot	Live 1.0-4.9 DBH/DRC on microplot	1	1			
Live 5.0+ DBH/DRC	Live but shrank < 5.0 and on microplot	1	1			
Live 1 inch +	Live but land no longer qualifies as forest	1	1			
Live 5.0+ DBH/DRC	Standing dead 5.0+	1	2		1	10-80
Live 5.0+ DBH/DRC	Down dead 5.0+	1	2		0	10-80
Live 1.0-4.9 DBH/DRC on microplot	Dead 1.0-4.9 DBH/DRC	1	2		0	10-80
Live 1.0-4.9 DBH/DRC on microplot	Dead 5.0+ (standing or down)	1	2		0 or 1	10-80
Live 1.0+ DBH/DRC	Cruiser unable to locate tree due to a weather (including geologic, such as landslide) or fire event & assume tree is down dead **or** you can see tree and it is dead and off the plot	1	2		0	30 or 50
Live 1.0+ DBH/DRC	Cut and left in the woods	1	2		0	80
Live 1 inch +	Dead and land no longer qualifies as forest (land clearing or conversion to nonforest land use)	1	2		0 or 1	10-80
Live 1.0+ DBH/DRC	Tree removed (cut and hauled away)	1	3			80
Live 1 inch +	Gone (cut and removed) and land no longer qualifies as	1	3			80

Previous Measurement	Present Measurement	PREVIOUS TREE STATUS	PRESENT TREE STATUS	RECONCILE	Standing Dead	CAUSE OF DEATH
	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 live shrank <5.0 and NOT on microplot	1	0	5		
Live 1.0-4.9 DBH/DRC	Tree live 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	Live 1.0+ DBH/DRC, shouldn't have been tallied—not a tally species—cruiser error	1	0	7		
Dead 5.0+ DBH/DRC	Dead 5.0+ DBH/DRC, shouldn't have been tallied—not a tally species—cruiser error	2	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	2	0	6		

Previous Measurement	Present Measurement	PREVIOUS TREE STATUS	PRESENT TREE STATUS	RECONCILE	Standing Dead	CAUSE OF DEATH
	movement) or weather event (e.g., hurricane) and you can still see the tree					
Dead 5 inch +	Nonsampled area now	2	0	9		
Missed live	Live 1.0+ DBH/DRC	-	1	3		
< 5.0 live	5.0+ DBH/DRC live (not on the microplot)	-	1	1		
< 1.0 live	1.0-4.9 DBH/DRC live	-	1	1		
< 1.0 live	5.0+ DBH/DRC live (on the microplot) (Through growth) (very rare)	-	1	2		
Complete Nonsampled plot before	Live 1 inch +	-	1			
Partial Nonsampled area before	Live 1 inch +	-	1	1 ~~3~~		
Nonforest area 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)~~ (not on the microplot)	-	2	1	~~0 or~~ 1	10-80
Complete Nonsampled plot before	Standing Dead 5 inch+	-	2			
Partial Nonsampled area before	Standing Dead 5 inch+	-	2	1 ~~3 or 4~~		
Nonforest before	Forest now, Previously live, now Standing Dead 5 inch+	-	2	1	1	10-80
Nonforest before	Forest now, Previously dead, now Standing Dead 5 inch+	-	2	1	1	

Appendix 9+N. Invasive Plant List – Adjusted to reflect the selected NRS Invasive Plant List

Species	NRCS PLANTS Code	Common name	Life form	nd	sd	ks	ne	mo	ia	mn	wi	il	in	mi	oh	wv	md	de	nj	pa	ny	ct	ma	vt	nh	me	ri
Microstegium vimineum	MIVI	Japanese stiltgrass, Nepalese browntop	grass					x				x	x		x	x	x	x	x	x	x	x	x				
Phalaris arundinacea	PHAR3	reed canary grass	grass	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Phragmites australis	PHAU7	common reed, phragmites	grass	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Alliaria petiolata	ALPE4	garlic mustard	herb	x		x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	
Centaurea biebersteinii	CEBI2	spotted knapweed	herb	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Cirsium arvense	CIAR4	Canada thistle	herb	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Cirsium vulgare	CIVU	bull thistle	herb	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Cynanchum louiseae	CYLO11	Louise's or black swallow-wort	herb			x	x	x		x	x	x	x	x	x		x		x	x	x	x	x	x	x	x	x
Cynanchum rossicum	CYRO8	European swallow-wort	herb					x					x	x					x	x	x	x	x		x		
Euphorbia esula	EUES	leafy spurge	herb	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Hesperis matronalis	HEMA3	Dame's rocket	herb	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Lysimachia nummularia	LYNU	creeping jenny	herb			x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Lythrum salicaria	LYSA2	purple loosestrife	herb	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Polygonum cuspidatum	POCU6	Japanese knotweed	herb		x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
*Polygonum x. bohemicum**	POBO10	(P. cuspidatum x. P. sachalinense hybrid)	herb			Exact extent of distribution not yet known, but has been found on the east and west coasts																					
Polygonum sachalinense	POSA4	giant knotweed	herb							x	x	x		x	x	x	x	x	x	x	x	x	x	x		x	x
Berberis thunbergii	BETH	Japanese barberry	shrub	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Berberis vulgaris	BEVU	common barberry	shrub	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Elaeagnus umbellata	ELUM	autumn olive	shrub			x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Frangula alnus	FRAL4	glossy buckthorn	shrub				x		x	x	x	x	x	x	x	x	x		x	x	x	x	x	x	x	x	x
Ligustrum vulgare	LIVU	European privet	shrub				x		x		x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Lonicera maackii	LOMA6	Amur honeysuckle	shrub	x		x	x	x	x		x	x	x	x	x	x	x	x	x	x	x		x				
Lonicera tatarica	LOTA	Tatarian bush honeysuckle	shrub	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Lonicera x bella	LOBE	Showy fly honeysuckle	shrub						x	x	x	x	x	x	x		x		x	x	x	x	x	x	x	x	x
Lonicera morrowii	LOMO2	Morrow's honeysuckle	shrub					x	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	x	x	x
Rhamnus cathartica	RHCA3	common buckthorn	shrub	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Rosa multiflora	ROMU	multiflora rose	shrub			x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Spiraea japonica	SPJA	Japanese meadowsweet	shrub					x	x			x	x	x	x	x	x	x		x	x	x	x		x	x	x
Viburnum opulus	VIOP	European cranberrybush	shrub	x	x	x	x	x	x	x	x	x	x	x	x	x	x		x	x	x	x	x	x	x	x	x
Acer platanoides	ACPL	Norway maple	tree							x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Ailanthus altissima	AIAL	tree-of-heaven	tree			x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	x	x			x	x
Albizia julibrissin	ALJU	silktree	tree					x				x	x	x	x	x	x	x	x	x	x		x				
Elaeagnus angustifolia	ELAN	Russian olive	tree	x	x	x	x	x	x	x	x	x		x	x		x		x	x	x	x	x	x		x	x
Melaleuca quinquenervia	MEQU	punktree	tree																								
Melia azedarach	MEAZ	Chinaberry	tree					x													x						
Paulownia tomentosa	PATO2	princesstree	tree					x				x	x		x	x	x	x	x	x	x	x	x				x
Robinia pseudoacacia	ROPS	black locust	tree	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Tamarix ramosissima	TARA	saltcedar	tree	x	x	x	x																				
Triadica sebifera	TRSE6	tallow tree	tree																								
Ulmus pumila	ULPU	Siberian elm	tree	x	x	x	x	x	x	x	x	x	x	x	x	x	x			x	x	x	x	x	x		
Celastrus orbiculatus	CEOR7	oriental bittersweet	vine						x		x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Hedera helix	HEHE	English ivy	vine					x				x	x	x	x	x	x	x	x	x	x		x				
Lonicera japonica	LOJA	Japanese honeysuckle	vine			x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	x	x		x	x	x

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

			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
ACPL	*Acer platanoides*	Norway maple	Y							
AIAL	*Ailanthus altissima*	tree of heaven (341)[h]	Y				Y	Y		
ALJU	*Albizia julibrissin*	silktree (345) [h]	Y				Y	Y		
ALPE4	*Alliaria petiolata*	garlic mustard	Y	Y			Y	Y		
BETH	*Berberis thunbergii*	Japanese barberry	Y							
BEVU	*Berberis vulgaris*	Common barberry	Y							
CEOR7	*Celastrus orbiculatus*	oriental bittersweet	Y				Y	Y		
CEBI2	*Centaurea biebersteinii*	spotted knapweed	Y	Y	Y	AZ,CO,ID, MT,NV,NM, UT,WY				
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				

			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
CYLO11	*Cynanchum louiseae*	Louis' swallow-wort	Y							
CYRO8	*Cynanchum rossicum*	European swallow-wort	Y							
ELAN	*Elaeagnus angustifolia*	Russian olive	Y			CO,NM	Y	Y		
ELUM	*Elaeagnus umbellata*	autumn olive	Y				Y	Y		
EUES	*Euphorbia esula*	leafy spurge	Y		Y	AZ,CO,ID, MT,NV,NM, UT,WY				
FRAL4	*Frangula alnus*	glossy buckthorn	Y							
HEHE	*Hedera helix*	English ivy	Y				Y	Y		
HEMA3	*Hesperis matronalis*	dames rocket	Y			CO				
LIVU	*Ligustrum vulgare*	common privet European privet	Y				Y	Y	9	
LONIC	*Lonicera*	Non-native bush honeysuckles	Y				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							
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
MEQU	*Melaleuca quinquenervia*	punktree (992) [h]	Y					Y		
MEAZ	*Melia azedarach*	Chinaberrytree (993) [h]	Y				Y	Y		
MIVI	*Microstegium vimineum*	Nepalese browntop Japanese stiltgrass	Y				Y	Y		
PATO2	*Paulownia tomentosa*	princesstree (712) [h]	Y				Y	Y		PATO2
PHAR3	*Phalaris arundinacea*	reed canarygrass	Y	Y						
PHAU7	*Phragmites australis*	common reed	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
RHCA3	*Rhamnus cathartica*	common buckthorn	Y							RHCA3
ROPS	*Robinia pseudoacacia*	black locust	Y							ROPS
ROMU	*Rosa multiflora*	multiflora rose	Y							ROMU
SPJA	*Spiraea japonica*	Japanese meadowsweet	Y							
TARA	*Tamarix ramosissima*	Saltcedar (991) [h]	Y			CO,NV				TARA
TRSE6	*Triadica sebifera*	tallowtree (994) [h]	Y				Y	Y		TRSE6
ULPU	*Ulmus pumila*	Siberian elm (974) [h]	Y			NM				ULPU
VIOP	*Viburnum opulus*	European cranberrybush	Y							VIOP
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

Regional Appendix A. Plot Establishment and Relocation Procedures

Note: This aspect of the data collection will continue to evolve with technology and other procedures determined to be more efficient for the region. If you have questions on what procedures to follow, contact you supervisor or contractor officer representative.

This appendix describes how remeasured sample plots are relocated and how new sample plots are established.

Note: **Prior to plot establishment, land owner permission (verbal or written) must be obtained for all plots that require access**. See Regional Appendix B for additional information.

A.1 PROCEDURES TO LOCATE PLOTS

A.1.1 LOCATING PLOTS FROM A PREVIOUS CYCLE

Most remeasurement plots revisited during this cycle have an established starting point (SP) and course to sample location. In addition, GPS coordinates were collected at plot center and the SP location. On these plots use this information for locating the plot center (PC).

The plot packet will contain the information needed for relocating a plot. This packet should contain an SP location map drawn by previous crew, GPS coordinates (SP and PC), an aerial image of plot site, and a topographic map marked with the location of plot center. Navigate to plot center by entering the PC coordinates into the GPS unit. An alternate method is to locate SP and use the distance and azimuth listed on the plot sheets under the *course to sample location* to traverse to PC.

Visiting and measuring SP is no longer required. However, we are maintaining the SP information and course to sample location information. Record this information from the old plot sheet to the new plot sheet and check that this information was downloaded in the PDR correctly.

A.1.2 LOCATING A REMEASUREMENT PLOT USING ORIGINAL SP AND COURSE TO SAMPLE

After locating the SP, traverse to the plot using the distance and azimuth recorded by the last crew. If the original PC is not found at the end of the traverse, search the area for evidence of the old plot. Items to look for are paint on the tree bases (vertical line) and at breast height (horizontal line). In the west, look for 10-inch wire pins and bits of flagging at each subplot and witness trees (painted with an "X"). In the east, look for a dowel at subplot center and subplot 1 witness trees (i.e., marked with two parallel lines above DBH and below a 1 foot stump line).

If your GPS unit is not working and the SP cannot be found, a remeasurement plot can be located using the aerial image. (See: **LOCATING A PLOT USING THE IMAGE**)

A.1.3 LOCATING A PLOT USING GPS COORDINATES

Use the GPS coordinates provided when establishing a plot for the first time. These coordinates are listed on the printed plot sheet provided to the crew. The true location of the plot is the ‘X’ on the image. If the ground location determined by the GPS is markedly different from the ‘X’ on the image (i.e., two chains plus or close but in different land use), then the ground location will need to be adjusted to the location of the ‘X’.

Level of hierarchy for plot location:

1. Pinprick on an aerial photo image from last cycle
2. Pinprick on a DOQ from last cycle
3. 'X' on a DOQ
4. GPS coordinates from last crew (assuming an error was not made when collecting)
5. GPS coordinates on the plot sheet

Navigating from SP to PLOT CENTER (PC) using GPS coordinates.

1. Enter PC coordinates from plot sheet into GPS unit
2. Establish an SP and collect and record coordinates
3. Navigate to within 100 to 120 feet of the PC coordinates entered
4. Establish a Waypoint(WP) by averaging 180 points with the GPS unit
5. Calculate the distance and azimuth from the WP to PC
6. Chain the remaining distance and azimuth from the WP to PC
7. Check to see if the ground location matches the image location
8. If the location matches establish the plot
9. Calculate distance from SP to PC using the GPS unit and record on the plot sheet and in the PDR

NOTE: The distance and azimuth from the WP to PC to locate the plot is not recorded.

A.1.4 LOCATING A PLOT USING THE IMAGE

Use this method of locating a plot when the GPS unit is not working. This method will work for establishing a new plot or relocating old plots when old information is unavailable.

Establishing a new course to sample

- Select and record a **BASELINE** on the aerial image.
- Select and record **SP** description
- Monument the Starting point
- Determine "Course to sample
  - Distance and azimuth computation
- Record and traverse the "course to sample"
  - Chaining
  - Location correction

A.1.5 BASELINE

A BASELINE (or reference line) links the photo image and the ground with a compass bearing. This reference line may then be used to determine the azimuth from SP to PC.

Locate the BASELINE by finding two features on the ground that are easily recognized on the aerial image. The two features should be at least 10 chains apart when using an aerial image with a scale 1:15,840. Select such features as straight road sections, drainage ditches, or two distinct trees. Avoid using railroads or major power lines since they influence the compass reading.

Pinprick both features on the photo and circle the pinpricks on the back of the photo. Draw a line between these pinpricks on the back of the photo with an arrow at one end of the line to indicate the azimuth direction.

Important Note: East-west azimuths are reversed when working on back of photo.

Measure the azimuth between the two features with a compass to the nearest half-degree and record it on the back of the photograph.

A.2 STARTING POINT INFORMATION

A.2.1 STARTING POINT (SP)

A starting point is established for the purpose of locating a sample plot. **It should be as near as possible to the sample location yet not on the same acre as the sample plot.** An SP must be at least 140 feet from PC, to utilize the *MIDAS PDR Application* utility “Locate Subplot”. This utility allows you to traverse directly to subplots 2 – 4, and requires that an “off plot” location like SP be at least 140 feet from the destination subplot. When selecting the SP, make sure it is easily located on the ground, and on the image, and not likely to die or be cut by next survey. Select a prominent tree located at the edge of a field or clearing, at a bend in a stream, or any landmark easy to find on the next survey. An SP tree must provide the next crew a point from which to physically and efficiently chain to PC during all seasons and water levels **(i.e., without the aid of a GPS).** It will help re-locate the plot center at the time the plot is re-measured.

Using both the new and/or old photograph(s) and/or provided image, locate the SP.

Pinprick the SP on the image that has the sample location pinpricked. Label and circle the pinprick "SP" on the back of the image.

A.2.2 STARTING POINT TREE MONUMENTATION (East v. West)

<u>East Procedures</u>: In the field, mark the SP with two parallel diagonal scribe or paint marks, each about 4 inches long and 4 inches apart, at 5-1/2 ft above ground, and near the ground, below an imaginary 1 ft high stump. The lower marks are referred to as “stump scribes.” Place the stump scribes on the downhill side of the tree whenever possible. This is done in case the SP is cut. The stump mark in most cases can still be viewed after a tree is cut. The SP marks should face the direction of approach so that future crews may readily find them.

If a bark scribe is used, **DO NOT CUT INTO THE CAMBIUM.** It is important that scribe marks be made carefully so that they do not expose or penetrate the cambium of the tree. Cutting into the cambium can compromise the health of a tree. Scribes should only be made in the outer bark layer of thick-barked trees. Use paint on thin-barked trees.

Figure RA1a. Illustration of SP marks in the east. Note: Bark scribes and/or paint have been utilized in previous cycles.

West Procedures: Mark the SP with paint facing the direction of normal approach. Paint "SP" (in letters four-inches tall) at 5-1/2 ft above ground. Paint three-inches tall "SP" below an imaginary 1 ft high stump. Place on the downhill side of the tree whenever possible. Again this is done in case the SP is cut.

Figure RA1b. Illustration of SP marks in the west.

Never paint or scribe trees located on a landowner's yard without permission from the landowner.

Note: Use discretion in painting or scribing trees on private lands and in other well-traveled areas like public trails. Make a note on the plot sheet when the marking deviates from normal procedures. In reserved areas, paint and scribes are not used unless the manager of the reserved area indicates otherwise. Instead, nail an aluminum tag marked with "SP" to the base of the tree. Please make a note on the plot sheet if reserved areas are marked differently than with a nail and tag at the base.

Note: Black Hills National Forest plots in South Dakota receive a tag at the base and at DBH.

If the reserved area is a National Park or National Wilderness Area, we have a National agreement to use aluminum tags and nails. An excerpt for the National Forest Wilderness areas agreement is shown below.

The use of scribes and paint are prohibited on plots located in Wilderness areas on National Forests. Starting point trees will not be painted or scribed. Instead, nail a tag marked with "SP" to the base of the tree facing the direction of normal approach. If the starting point is in the view of a known path, trail or other public area, place the tag away from the public area. In addition describe the starting point on the plot record and include reference landmarks. If old scribe marks are present, do not re-scribe. Apply tags as instructed. [SERVICEWIDE AGREEMENT 09-SA-FIA01]

Describe the SP on the plot sheet under "Starting Point Description." Include the landmarks you used to locate SP. Specify details of the SP such as:

- Species, DBH, and the aspect on which the tree is painted or scribed
- Any nearby road, fence, pasture, etc. and the tree's location in relation to that feature.
- Any noticeable characteristic of the SP tree, such as a fork at 10 feet, multiple stems, deer stand, etc.

A.3 COURSE TO SAMPLE LOCATION

A.3.1 AZIMUTH AND DISTANCE COMPUTATION

On the back of the photograph, connect the pinpricks for the SP and plot center (PC) with a straight line. Extend this line to intersect the BASELINE. Lines should extend well beyond the intersection to allow reading the back-sight off the 360° protractor to check the accuracy of the angle being measured.

If the BASELINE and the line to the sample location do not intersect on the photograph, draw an additional REFERENCE LINE that will intersect the BASELINE and the “Course to Sample” line (i.e., course to plot). Indicate the directions of the sample location line and the BASELINE by putting an arrow at the end of each line. Measure the angle between these lines starting from the BASELINE.

Be sure to use an inverted 360° protractor or flip a standard 360° protractor over because east-west azimuths are reversed 180° when working on the back of the photo. Align the 360° protractor over the azimuth of the BASELINE to get the azimuth of the sample location line. The azimuth is read directly off the protractor once the azimuth of the BASELINE is correctly aligned on the inverted protractor. To minimize error, check the back-sights of both BASELINE and “Course to Sample” lines. Back-sight is the surveying method taken backwards or 180° in the opposite direction. Ex: If your baseline was 20° then the back-sight would be 200°. If the SP to PC was 90° then the back-sight (or PC to SP) would be 270°. If the protractor is precisely aligned then the two lines (baseline and SP to PC line) will be lined up accurately with each of their back-sights being 180° in the opposite direction. This is a check to see if the protractor is precisely aligned for an accurate reading. Repeat this procedure if a REFERENCE LINE is needed to intersect the course to sample line. Refer to Figure RA2.

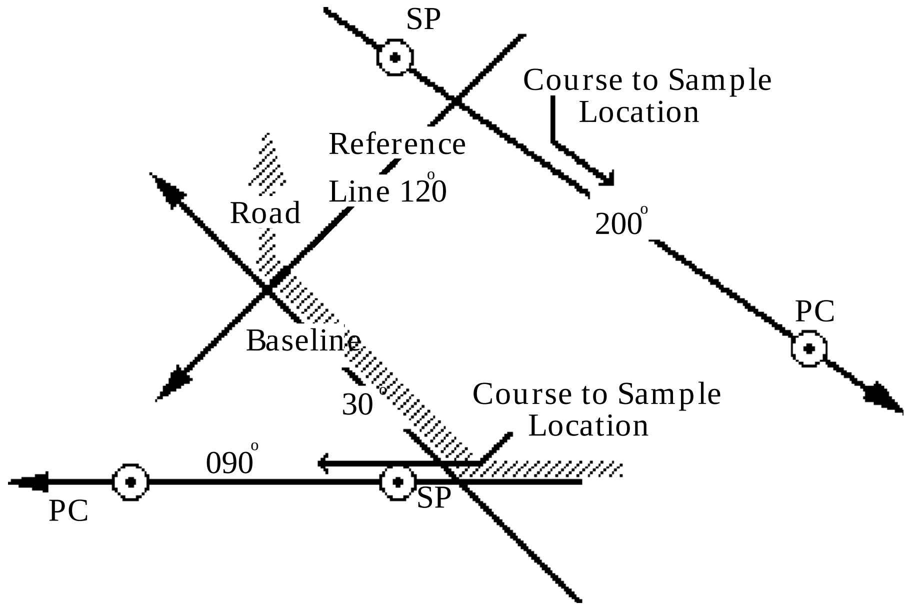


Figure RA2. Back of photo documentation that includes azimuths for baseline, reference line and course to sample location. Identification of SP and PC are also included.

With a photo scale, measure the distance on the photo from the SP to the PC, to the nearest quarter chain (Photo scales, corresponding to the aerial image, are supplied.) Hold the photo up to the light and carefully measure, from the center of one pinprick to the center of the other. Record both the distance (in feet) and the direction on the back of the image, on the plot sheet under "Course to Sample", and in the data recorder.

A.3.2 TRAVERSING or CHAINING

Using compass and measuring tape run a course on the computed azimuth. Distance correction for slope is necessary when slope exceeds 10%. Using the *Suunto* clinometer, slope correction can be quickly determined and added after the line is run out. In Regional Appendix E a slope correction table is available to determine the correct adjustment that is added to the line along the slope. For example, to chain a horizontal distance of 66.0 feet on a 25% slope, chain 68.0 feet (66.0 + 2.0) on the slope. Once the computed course has been run, place a permanent stake at the end of the computed course.

Important: Make sure that photograph location agrees with ground location.

A.3.3 LOCATION CORRECTION FOR PLOTS ESTABLISHED BY PINPRICK

If the ground location is clearly not the point pinpricked on the photograph (more than 2 chains error), and the correct location can be determined on the ground, place a second pin at the correct location. Note the azimuth and distance from the initial pin to the relocated pin and record these items under "Course to Sample Location" on the plot header sheet and remove the first pin. The initial pin is referred to as a “Turning Point.” The second pin becomes the location of the plot.

This is only done on a NEW PLOT when it is obvious that the location determined by chaining azimuth and distance does not agree with the location on the photo or image provided.

For REMEASUREMENT plots chain the computed azimuth and distance along the approach line and mark the location. If the original PC is found here, continue to relocate other subplots and establish any new subplot or microplot locations as needed. If the original PC is not found search the area for evidence of the plot. Once located, a “Turning Point” may be needed. After finding PC, establish a Turning Point (TP) if the distance between PC and the end of the approach line exceeds 3% of the chaining distance.

A.3.4 OTHER NOTES on locating plots and subplots

If no evidence of the old plot can be found try the following.

Search the area of five chains around the area you navigated too.
If you used GPS navigation to PC, find the old SP and follow course to sample listed on plot sheets and search the area around your ending point.

Look for trees marked at the base and at DBH with paint or scribe marks. When several of these trees are found in close proximity, examine the original plot data and try to match these trees to trees on one of the original subplots.

Match current tree species by comparing azimuths, distances, and DBH to the data for trees listed in the historic tree records and determine the subplot number. Use triangulation to find the subplot center and mark it a wooden dowel or a piece of galvanized or aluminum wire bent into a loop with a piece of blue flagging tied through it. If this is not the plot center move to the plot center by knowing which subplot you are on and chaining the distance and azimuth to plot center (PC).

After finding the old pin at Plot Center, inspect the condition of the old pin or dowel. If the old pin or dowel requires replacement, remove the old pin or dowel and place a new marker at the same location. The use of multiple markers at PC is not required. Multiple markers can degrade the accuracy of horizontal distance measurements to individual tally trees. **If the old pin or dowel cannot be found, triangulate to accurately re-establish the plot center in the original location.**

If several tally trees are identifiable, use the triangulation method to relocate the subplot center. If this is not possible, due to lack of trees or other circumstances, locate adjacent subplots and use these to triangulate to the missing subplot. This procedure should provide the general location of the missing subplot and reduce the search area.

It is very important to locate each individual subplot center as accurately as possible. Finding each subplot may be a challenge—most of the flagging disintegrates and the wires rust and may appear like twigs or roots. The best method is to run out 120 feet (add slope if greater than 10%) from subplot 1 at the proper azimuth, mark the spot, and search by running your hands through the area. Check plot sheets for reference tree information if no 5 inch trees were tallied at the last measurement.

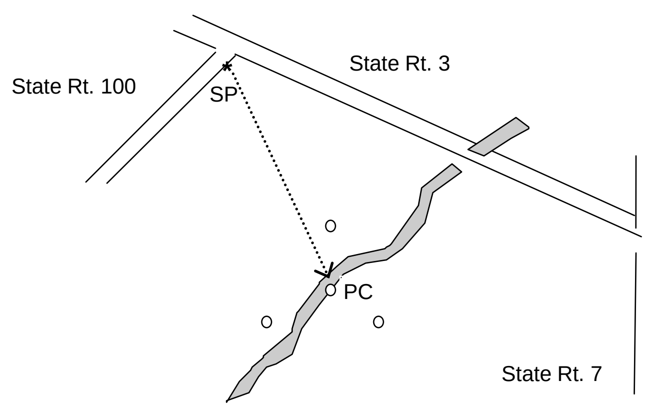
A.3.5 NAVIGATING TO SUBPLOTS OTHER THAN PC

When navigating to PC, you may encounter some condition that makes it impossible or impractical to physically reach PC and put in a marker. PC may be in water, the center of a barn, or on a busy highway. Other subplots on the plot may be in a forest condition and must be installed. In this case, chain to any one of the outer subplots and establish it first. This can be done by using the *MIDAS PDR Application* utility “Locate Subplot” to compute the direct distance and azimuth from SP to any subplot center and chaining directly to a given subplot. This method is best when you can see you will have trouble reaching PC before you start chaining.

Note: The *MIDAS PDR Application* utility works only if you are farther than 140 ft away from PC.

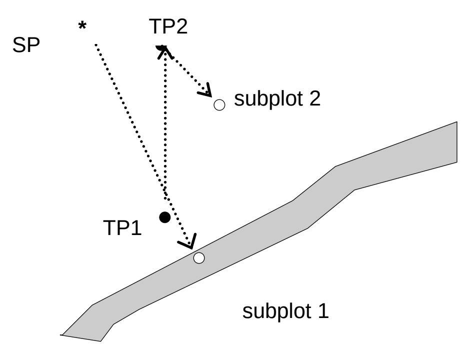
A "Turning Point" can also be used at any point when chaining to reach another subplot center. At any point while chaining, establish a Turning Point, chain the distance and azimuth from PC to the subplot you wish to occupy, and then continue the original course. For example, the course from the SP to PC is 700 ft. @ 200°. After chaining 600 ft you can see that PC will be in a river and it would be best to chain to subplot 2. At 600 ft, establish a Turning Point and traverse 120 ft. @ 360° (the distance and azimuth from PC to subplot 2). Establish another Turning Point and complete the original course (200° for the remaining 100 ft) to reach subplot 2.

The following example illustrates using a "Turning Point" to locate subplots 2 - 4 when subplot 1 is inaccessible. The stream is noncensus water that is too deep to access or cross. The crew establishing the plot does not know that the subplot is inaccessible until they encounter the stream while chaining from SP to PC.

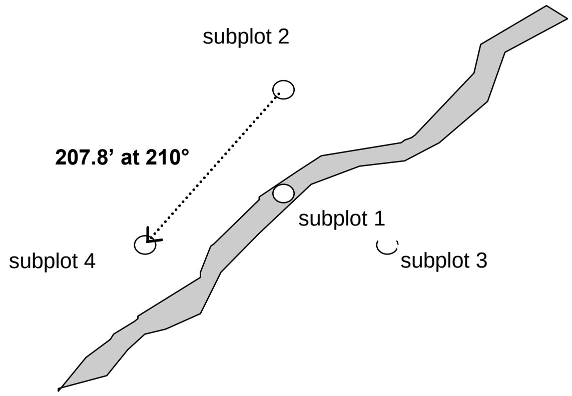


Originally, the course to plot was 534 ft at 150°. The crew chains 500 ft to the edge of the stream and finds that subplot 1 cannot be occupied.

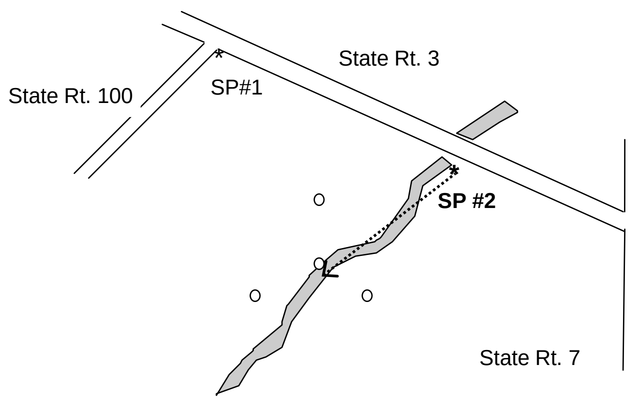
To establish subplot 2 without occupying subplot 1, the crew can establish a turning point (TP1) at the 400 ft station of the course to sample location and proceed due north for 120 ft. Here a second turning point (TP2) is established and the crew proceeds 134 ft at the original course to sample location azimuth of 150°. This is the proper location of subplot 2. Note that TP1 could be established at any distance along the original traverse as long as the distance from TP2 to subplot 2 is adjusted as well.



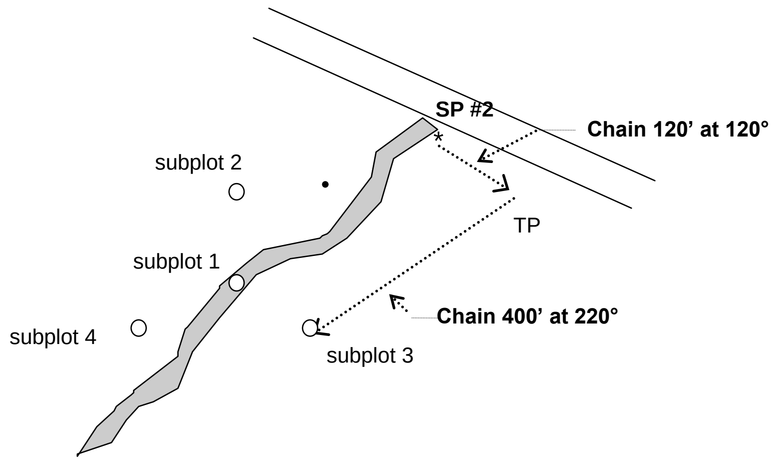
Subplot 4 can be accessed directly from subplot 2. The distance and azimuth from subplot 2 to subplot 4 is 207.8 ft at 210°. (See the table in Section 0.1 showing how to locate outer subplots from a subplot other than subplot 1.)



Finally to complete subplot 3, the crew will need to access this subplot from the other side of the stream. A second SP and course to sample location is established using the aerial photography. (Note: If this procedure is followed for a new plot, you must first accurately pinprick the PC ground location and orient the photo.) Example below: SP#2 to PC is 400 ft at 220°.



Since PC cannot be occupied or safely crossed, a second SP and course to sample location is used to establish subplot 3 from the opposite side of the creek. This can be accomplished by proceeding 120° for 120 ft from SP #2 to a turning point. This turning point represents the relative location of subplot 3 to subplot 1. From the turning point, proceed on the calculated course to sample location of 400 ft for 220° to locate subplot 3. This procedure uses the same techniques used to locate subplot 2 from the original course to sample location. (Note: If this procedure is followed for a new plot, you must first <u>accurately</u> pinprick the PC ground location and orient the photo.)



The GPS unit may also be used to locate subplots without occupying PC. In the above illustration, the coordinates at subplot 3 can be determined from the subplot 1 coordinates. Coordinates are then collected at SP #2. A course to plot can then be determined from these two sets of coordinates. However, caution must be used when establishing subplot 3 in this method. All GPS coordinates involve error. Therefore, prior to any data collection at subplot 3, the crew should verify, the best they can, that they are the proper distance and azimuth from the other subplots.

Crews should implement a method that is most efficient given various conditions that exist on the photo and plot area.

Whenever subplots are established without occupying subplot 1, a detailed description of the methods used must be written in the PLOT NOTES. Photos with more than one SP and course to sample location must be properly labeled. Also, whenever subplot 1 is not physically occupied, the crew should reference <u>one</u> of the subplots (2-4) with witness trees and collect GPS coordinates at this point. These coordinates are recorded in the PLOT NOTES only since they do not reflect PC at subplot 1.

A.4 PROBLEMS IN LOCATING PLOTS

A.4.1 Lost Plots

For a remeasurement plot where there has been no major disturbance to the plot area, the initial crew must do their best to find the previous plot location. If the first crew fails to locate the plot, a second veteran crew, crew leader, QA personnel or field supervisor should attempt to find it. This second effort is forewarned and, with careful notes from the first crew detailing circumstances encountered, may have success. If both efforts fail, then a replacement plot is established at the location of the X' on the image or the corresponding GPS coordinate.

- PLOT STATUS of 3 is assigned to the lost location data file.
- A plot file will be completed with the original number of the lost plot.
- A second plot file will be created with the <u>new</u> PLOT NUMBER for the plot sampled.
- Both data files and plot sheets will be returned to the regional office.
- The crew must bring this plot to the attention of the crew leader, QA personnel or field supervisor

A.4.2 Disturbed Plots

When there has been a major disturbance (such as the area has been clearcut and bulldozed) and it is obvious that the plot cannot be relocated, establish the plot as near as possible to the old PC.

- This plot does not get a new PLOT NUMBER.
- Account for previous trees before entering any new tree data.

A.4.3 PLOT IN THE WRONG LOCATION

If a re-measurement plot was established in the wrong location (i.e., not in the same location as marked on the aerial image), re-establish the plot in that same location. If the error is more than 2 chains or if it needs clarification for next crew, pinprick the new photo where the plot is actually located.

Note: Occasionally the error will be less than 2 chains; but due a physical feature on the ground or photo, the PC mark requires correction. Example, the PC mark is on the north side of the road, but the plot is on the south side of the road. In this case please pinprick the aerial image.

In the "Notes" section of the plot sheet, indicate that you moved the PC mark to agree with the original location the plot was installed. Record the distance and azimuth (using a photo scale) from the original PC mark on the image to where the plot is actually located. Bring such plots to the attention of the crew leader or state supervisor. It is assumed that the plot is located in the correct location unless physical evidence of the plot is found in the wrong place (i.e., pins/dowels, paint or flagging).

A.4.4 PREVIOUSLY DENIED ACCESS PLOTS

Denied Access (DA) plots from the last cycle will be sent out to attempt access in this cycle.

- Contact the current land owner to ask for permission
- Code as DA if owner denies access.
- If permission is granted, reference the previous Sample Kind (SK) on last cycle's plot sheet

    - If it was a SK 1, then it was a new plot during the last cycle and it has never been installed. Install the plot as a new plot.
    - If the plot was installed (i.e., 2 cycles ago), determine the location from the data of the last successful visit. Try to find the old subplot centers, but *treat as a new plot for data collection*. (i.e., do not reconcile data from 2 cycles ago).
    - If the plot that was installed, but the plot data from the last successful visit is not available or inadequate for relocation, establish the plot at the 'X' on the photo or provided GPS coordinates.

A.4.5 LOCATION DIFFERENT THAN REMEASUREMENT PLOT LOCATION

When the new DOQ location and/or the coordinates do not match the previous DOQ and/or coordinates, the previous information is considered correct. **Be sure to place the plot in the same location as the previous crew.** Example: if the previous crew placed the plot completely in a non-forest condition but the new DOQ places a point in a forested condition, assume the previous crew was correct. Locate the established plot using the SP to PC "Course to Sample Location" or the subplot "Reference Tree" information.

A.5 PLOT LOCATION DATA recorded on plot sheets

A.5.1 SKETCH MAP OF PLOT LOCATION

A "Starting Point Map" must be drawn for all plots. Sketch maps should provide enough information for a plot to be relocated without the use of the aerial photos or GPS coordinates. Details (bridges, rivers, trails, etc.) and mileage to an easily located intersection or reference point must be included. Inspectors check the quality of a sketch map by attempting to locate a plot with the sketch map. A plot that cannot be located due to a poor sketch will be considered unsatisfactory. Neatness and clarity are desired. Artwork is not necessary and is not required. A good sketch map should take no more than five to ten minutes to complete.

It must include:

- References to the nearest town or major secondary road
- Names and/or numbers (if available) for all roads shown on the sketch along with house or box numbers, when appropriate
- Key landmarks (natural and manmade) near SP or important intersections along route
- Use common symbols to represent features like fences, railroads, power lines etc.
- Include North arrow with a not to scale reference (N.T.S)
- Location of SP and PC identified
- Location for safe vehicle parking
- Record distances between road intersections from an originating intersection to SP. Distances are recorded in miles, tenth's of mile, chains, or feet.
- Gates – locked or unlocked
- Off road trails/paths used to drive or hike to SP or PC

Do not draw a current map that is less detail oriented than the previous map(s).

A.5.2 PLOT DIAGRAM (Cluster map)

Use this space to show the location of contrasting condition classes and any unique features on or near the plot that may be helpful in relocating the plot at the next inventory. It is important that condition class boundaries be sketched in accurately to avoid problems on the next cycle when these boundaries will be remeasured.

A.5.3 SUBPLOT REFERENCE TREES

Subplot reference trees are used whenever there is a concern that the next crew may have a problem locating a subplot. Make complete notes of everything that you do so that it will be clear to the next crew. In some cases an object other than a tree can be used as a suitable reference marker.

Subplot center is referenced for the following situations:

- SUBPLOT STATUS = 1, subplot center is forested and no live trees ≥ 5.0 in DBH tallied on subplot or live saplings ≥ 3.0 in DBH tallied on the microplot.
- SUBPLOT STATUS = 1, subplot center is nonforest and no live trees ≥ 5.0 in DBH tallied on subplot or live saplings ≥ 3.0 in DBH tallied on the microplot.
- SUBPLOT STATUS = 2, subplot center is within 60 feet of a tree or other suitable object.
- A subplot that is used for a stocking check to determine condition must be referenced. This includes temporary subplots.

Reference trees should be within 60 feet of the subplot center and marked above DBH and at the base with paint or scribe marks facing the subplot center. There is no preferred reference mark. E.g., if using paint, an appropriate mark may be the associated subplot number. This mark makes it easier for the next cycle's crew to identify the subplot. If using a scribe, an appropriate mark may be an "X" or a triple-scribe mark "\\\". Whichever mark is used, indicate the mark type on the plot sheet's "Reference Tree" grid along with the other reference information as shown in the example.

Sub#	**Spp**	**DBH**	**Dist**	**Azm**	**Mark**
1	0931	060	265	003	///

In reserved areas do not use paint (or scribes) unless permission is granted. If permission is denied, a nail and tag is used with a reference mark at the base of the reference tree only. National Parks or National Wilderness areas require a nail and tag be used for a reference tree.

Tolerances and MQOs for reference trees (Spp, DBH, Dist, Azm) will be the same as described in the tree section for these variables.

A.5.4 NOTES

Record any additional information regarding ownership, plot and/or subplot relocation.

> "Notes should be full and exact so as to furnish for the benefit of later comers a complete record of the work done. In the case of resurveys they should be particularly clear as to the old marks found, so that the evidence which governed in the resurvey may be a matter of record. This rule holds especially in regard to starting points and corners…Notes should be so plainly and clearly written that any fairly intelligent man can understand them. They should be honest as well, not concealing actual errors...Errors are normal and to be expected. They grow out of imperfections in method that are imposed on the survey or by limitations in the matter of expense. Errors are not to be confused with mistakes or blunders."
> *– Austin Carey, Woodsman's Manual, Fourth Edition, 1932.*

A.6 GPS STARTING POINT VARIABLES

Record the latitude and longitude of the "SP" on the plot sheet and data recorder using the same procedures for collecting PC coordinates. See Regional Appendix H – GPS User's Guide.

A.6.1 SP LATITUDE DEGREES **[NDEG]**

Record the latitude degrees of the SP as determined by GPS.

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

A.6.2 SP LATITUDE MINUTES **[NMIN]**
Record the latitude minutes of the SP as determined by GPS.

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

A.6.3 SP LATITUDE SECONDS **[NSEC]**
Record the latitude decimal seconds of the SP to the nearest hundredth place as determined by GPS.

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

A.6.4 SP LONGITUDE DEGREES **[WDEG]**
Record the longitude degrees of the SP as determined by GPS.

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

A.6.5 SP LONGITUDE MINUTES **[WMIN]**
Record the longitude minutes of the SP as determined by GPS.

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

A.6.6 SP LONGITUDE SECONDS **[WSEC]**
Record the longitude decimal seconds of the SP to the nearest hundredth place as determined by GPS.

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

A.6.7 AZIMUTH TO PC **[AZM1]**
Record compass direction from the SP tree to the PC.

When collected: All plots visited in the field
Field width: 3 digits
Tolerance: None
MQO: 99% of the time
Values: 1-360

A.6.8 DISTANCE TO PC **[DIS1]**

Record the horizontal distance from the SP tree to the PC to the nearest foot.

When collected: All plots visited in the field
Field width: 4 digits
Tolerance: +/- 33 feet (1/2 chain)
MQO: 99% of the time
Values: 1 - 9999

Repeat the above two items if needed for tuning points to PC.

A.6.9 AZIMUTH TO PC **[AZM2]**
A.6.10 DISTANCE TO PC **[DIS2]**
A.6.11 AZIMUTH TO PC **[AZM3]**
A.6.12 DISTANCE TO PC **[DIS3]**
A.6.13 AZIMUTH TO PC **[AZM4]**
A.6.14 DISTANCE TO PC **[DIS4]**

"Surveying in forest land as compared with work done in towns and on farms is carried out under unfavorable circumstances. In the first place, timber and brush growth offer an obstruction to sighting; second, the work is often done far from a well supplied base; third, the limits of cost allowed are often the lowest practicable. These conditions have a strong effect upon the methods employed, and they also affect the choice of outfit. Equipment for such work should not usually be expensive, it should be as compact and portable as possible, and it should not be so delicate or so complicated as to be likely to get seriously out of order and so hold up a job." – *Austin Carey, Woodsman's Manual, Fourth Edition,1932.*

Regional Appendix B. Ownership Data Collection Procedures

OWNERSHIP INFORMATION

Ownership data are usually the first variables completed by a field crew. The process begins with a trip to the local tax office to review plat maps, examine aerial photos and interview the tax collector in an attempt to determine who owns the plot location. (Some counties and townships now have landowner parcel information available on the internet and at no fee. These sites have viewable parcel maps with owner name and address links based on the parcel number.) If ownership is obtained from a courthouse or town office write the parcel number underneath the owner information section on the plot sheet, this will make it easier to obtain the owner data at the start of the next cycle.

Although ownership information is only required for plots that are forested at PC, it is often a good idea to collect ownership information on all of the plots in the county, or town, while you are at the court house or township office. This is especially true in states or regions where there is a relatively small amount of nonforest land. The time spent gathering this extra information during your first visit will usually be a fraction of the time spent on a return visit after you discover that a previously nonforest plot has reverted to forest land.

Permission, verbal or written, must be obtained for all plots that require access. This is a requirement of federal legislation in *The Farm Bill.*

The following are a list of steps that describe how to go about obtaining permission once the landowner has been identified at the courthouse or town office

1. If the telephone number is determined, call the landowner to get permission. Plan ahead so that this is completed before you head to a county. Write on the plot sheet who granted permission and on what date along with any restrictions to access that the owner might have, such as to leave the gate open or be sure to call on the day of the visit.

   Retrieve an owner's telephone number via the internet or by calling directory assistance (area code + 555-1212); or try one of the following websites.

   - www.superpages.com : Go to People Pages tab. This website is good for looking up people's names. Ex: If you type the first name of William, it will also find the Bill's and Will's too.

   - www.whitepages.com : "Look up by Address" is a very helpful tool. This enables you to find landowners telephone numbers if they have a business at that address listed or if lady remarries and changes her last name. It also finds neighbors that live on the same road.

   - www.people.yahoo.com

   - www.michigan.gov/dnr: go to Forests, Land & Water tab >> center of the page to Michigan forests >> then to Commercial Forest Program. This will list landowners by legal description if they are in the CFL Program. This land is open to hunting and fishing.

   - www.411.com: Can search by partial names and addresses as well as by business names.

Also for more unusual last names (so not Smith), you can look on the internet for other folks with the same last name that live in the area, and try giving them a call and hope they are a relative. Identify yourself and briefly describe the program, next explain that you are unable to find the landowner to get permission and was hoping that they were a relative and would know how to contact them.

2. If a telephone number cannot be determined, drive by the owners place (if it is near the plot). If no one is home at the owner's house leave a note and a phone number to contact you. **If the owner does not live near the plot, stop at a house near the plot and try to get a telephone number from them.**

3. If you **(1)** cannot find a phone number and you leave a note at their house and don't hear back from the owner; **OR** if you **(2)** can't find the phone number and the owner does not live near the plot; **OR** if **(3)** a landowner does not return your telephone calls; **OR** if **(4)** you have already tried a "near by" neighbor's house to get some contact information which did not help; then send the landowner a certified letter (certified so you know if they received the letter). Only send a letter *after* you have attempted the 4 options above. Keep records of your attempts on the plot sheet. It is up to the person that is assigned the plot to send the letter and to monitor the plot status right through sending the electronic data – not necessarily the crewleader. Your name should be on the letter, the registered mail green card, and the return envelope. The crewleader will send out these letters once a week.

   This letter should contain:

   - Access consent reply slip
   - Self-Addressed-Stamped-Envelope
   - Landowner Information Sheet
   - "Your State in a Nutshell" sheet, if available
   - The FIA brochures along with the landowner insert
   - Your business card.
   - Don't forget to sign your landowner letter and make sure the date other relevant information on the letter and reply-slip are correct.

   Post cards will be sent to each office. Be sure to fill in the appropriate information on the post card.

4. Once you send a letter the plot is yours to track for permission. It is your responsibility to track it once it is sent and to handle it once it comes back.

5. If you do not hear back from the landowner within **30** days of the delivery date on the green registered mail card that you get back in the mail, send the owner a FIA contact post card which will state that you have sent them information more than 30 days ago and have still not heard from them. The post card will state that this is the last contact they will have from us and to please reply within 2 weeks. Keep notes on the plot sheet of these dates and include all postal forms with the plot.

6. If you do not hear back from the owner within **30** days of sending the **post card** out, call the plot denied. A plot is ruled denied after all the steps above have been exhausted.

7. If the owner **does** call back after these 60 days have passed and the plot is already processed as denied, call your supervisor, who will address the issue in the database so that the plot can be done by the crew. Once a panel is completed and the next panel is started, the PLOT STATUS is not changed.

8. If your letter comes back from the post office as **"undeliverable**" or **"return to sender"** call the courthouse and double check on the ownership for the parcel. If the wrong address was obtained in the first place, begin the contact process again. If the same address is identified by the courthouse, called the plot denied and explain in the notes section.

9. If your letter comes back as **"not claimed"** or **"refused"** start the whole letter process over from the start, just this time do not send the letter certified – send it normal mail. If you do not hear back from the owner after 30 days send the post card. If you do not hear back from the post card after 30 days call it denied.

10. When a plot is denied, the plot sheet must document the landowner contact attempts. Write in the notes section who was contacted and who denied it along with the dates of contact. If given, state why the landowner denied access. Attach a copy of all letters received back to the plot

It is important to plan ahead and the preceding steps should provide an efficient, consistent means to gather permission across the region. If you are assigned a small county without much public land, all contacts should be made prior to traveling. When one owner has multiple plots on their land, send one letter to cover all of the plots. An example of this would be some of the many large hunting clubs in Northern Lower MI. In some cases their plots might cross over county boundaries. Organize these plots based on ownership – not based on county. Be sure to let the owner know that they may have more plots on their land next year as well.

There may be other problems related to accessing a plot. Advance notice may be required to obtain keys, special permits, etc., prior to property access. Supervisors will provide assistance and instructions for these and other situations.

Note: Publicly owned lands like National Parks and Wilderness areas require permits for access and data collection. Some state publicly owned land also requires permits. Crews working in New York acquire a Temporary Revocable Permit (TRP)(annually) to facilitate access to many State lands administered by the Department of Environmental Conservation (DEC). Contact your field supervisor for assistance in obtaining these permits.

PRIVATE OWNER VARIABLES

Landowner variables are recorded on the plot sheet and in the PDR program. The plot sheet will indicate the owner regardless of OWNER GROUP. The PDR program owner data are recorded only when subplot 1's center condition is forested and the OWNER GROUP = 40. If subplot 1's PC is nonforest, ownership information is not entered even if there is forest land on the plot. Note: This electronic owner data are used to generate the *National Woodland Ownership Survey* sample and therefore subplot 1's PC status is the sampling criteria for this survey.

Upon accessing the plot verify the following with the landowner.

- Courthouse ownership information is not always up to date. Adjust as necessary on the plot sheet and in the PDR program when making contacts in the field.

- Public Land Survey System (PLSS) legal descriptions printed on the plot sheets are not always correct. If a change is necessary, mark it on the plot sheet and note the change to allow the database to be adjusted. Note: The following eastern states do not use this form of legal description: DE, CT, MA, MD, ME, NH, NJ, NY, PA, RI, VT and WV. OH and all states west use this legal description format of township, range, section and subdivision.

- If the person contacted is not the person listed as the owner, be sure to note who granted you access. This will assist the QA crews and the crews for next cycle.
- List date contacted and any restrictions that the landowner has placed on access. If the plot is accessed at a later date, the crew will be aware of the landowner's requests.

NRS PDR Note: See table at the end of this appendix for example data entry for OWNER FIRST NAME & OWNER LAST NAME.

B.1.1 OWNER FIRST NAME **[FNAM]**

Enter the first name of the owner. Not a required field for all owner types.

When collected: OWNER GROUP = 40 and SUBPLOT 1 CENTER CONDITION = CONDITION CLASS STATUS 1
Field width: 40 characters
Tolerance: No errors
MQO: At least 99% of the time
Values:

B.1.2 OWNER LAST NAME **[LNAM]**

Enter the last name of the owner.

When collected: OWNER GROUP = 40 and SUBPLOT 1 CENTER CONDITION = CONDITION CLASS STATUS 1
Field width: 40 characters
Tolerance: No errors
MQO: At least 99% of the time
Values:

B.1.3 OWNER STREET **[ADD1, ADD2, ADD3]**

Record the street address for the owner.

When Collected: OWNER GROUP = 40 and SUBPLOT 1 CENTER CONDITION = CONDITION CLASS STATUS 1
Field width: 40 characters
Tolerance: No errors
MQO: At least 99% of the time
Values:

B.1.4 OWNER CITY **[CITY]**

Record the city name for the owner.

When Collected: OWNER GROUP = 40 and SUBPLOT 1 CENTER CONDITION = CONDITION CLASS STATUS 1
Field width: 40 characters
Tolerance: No errors
MQO: At least 99% of the time
Values:

B.1.5 OWNER STATE **[ST]**

Record two digit State name for the owner.

When Collected: OWNER GROUP = 40 and SUBPLOT 1 CENTER CONDITION = CONDITION CLASS STATUS 1
Field width: 2 digits
Tolerance: No errors
MQO: At least 99% of the time
Values: all two character state codes

B.1.6 OWNER ZIP **[ZIP]**

Record the city zip code for the owner.

When Collected: OWNER GROUP = 40 and SUBPLOT 1 CENTER CONDITION = CONDITION CLASS STATUS 1
Field width: 15 characters
Tolerance: No errors
MQO: At least 99% of the time
Values:

B.1.7 PHONE **[PH#1, PH#2]**

Record the phone number of the landowner. Record using dashes between area code and the next 3 digits (exchange) and between the exchange and the number (i.e.: nnn-nnn-nnnn).

When Collected: OWNER GROUP = 40 and SUBPLOT 1 CENTER CONDITION = CONDITION CLASS STATUS 1
Field width: 10 digits
Tolerance: None
MQO: When available
Values: nnn-nnn-nnnn

B.1.8 PARCEL NUMBER **[PRCL]**

If this data is provided at the county courthouse, record the PARCEL NUMBER for the property as it is formatted by each county. Counties often use different formats across the region so formats will vary.

When Collected: All plots where info was provided by the respective courthouse
Field width: 100 characters
Tolerance: None
MQO: At least 99% of the time
Values:

Ownership Data Collection and Various Cases
Note: Enter ownership information for OWNER GROUP = 40
Note: Enter up to 40 characters for each scrolling field
Note: Some punctuation has been disabled because it affects how the MIDAS program edits and performs
Note: Typical rule for estates, trusts, etc., will be to include in the FirstName field in parenthesis after the first name. See examples below.

Situation	**Solution**	**E.g., Courthouse Listing of Owner (s)**	**E.g., FirstName Input**	**E.g., LastName Input**
Trust / Trustee	Enter the Trust name only	Wilfred Gray (Trust)	Wilfred - Trust	Gray
		James Jackson Trustee for the Jimmy Trust	Jimmy - Trust	Jackson
Estate	Enter in LastName with the following format ‘Estate of FirstName LastName”	Estate of Allen Anderson	Allen - Estate	Anderson
		Henry Davidson (Estate)	Henry - Estate	Davison
Hyphenated Name	Enter the full hyphenated last names under LastName with the hyphen	Cynthia Durst-McKay	Cynthia	Durst-McKay
Apostrophe	Enter name w/o the apostrophe leaving no spaces; do no capitalize the letter after the apostrophe	Kathy O’Neil	Kathy	Oneil
Dual caps in Last Name	Enter the name as one word with intermediate capitalization	Tammy McAllister	Tammy	McAllister
Two First Names	Enter the two first names under FirstName	Sally Ann Hansen	Sally Ann	Hansen
Middle Initial	Include as part of the FirstName w/o period	Jackie C. Christopherson	Jackie C.	Christopherson

Situation	**Solution**	**E.g., Courthouse Listing of Owner (s)**	**E.g., FirstName Input**	**E.g., LastName Input**
Prefixes	Include as part of FirstName in the format 'first suffix' w/o comma or period	Dr. Christopher Steele	Christopher Dr..	Steele
Suffixes	Include as part of FirstName in the format 'first suffix' w/o comma or period	Michael Haynes the Third	Michael III	Haynes
		Ralph Jones, Jr.	Ralph Jr.	Jones
Two owners – same last name	Enter first names in FirstName; Enter last name in LastNames	Jack & Patricia Frost	Jack and Patricia	Frost
		Steve Paulson Jr. and Steve Paulson Sr.	Paulson Steve Jr.	Paulson Steve Sr.
		Dr. and Mrs. Karl Kubas	Karl Dr Mrs	Kubas
Two owners – different last name	Enter one owner under FirstName ' lastname, firstname'; and the other owner under LastName 'lastname, firstname	George Nelson, Gregory T. Harris	Harris Gregory T.	Nelson George
		Jesse Jackson II and Jesse Jackson III	Jackson Jesse II	Jackson Jesse III
More than two owners	Enter on the first name listed	Liz Hanna, Dennis Hanna, Dacia Meneguzzo	Liz	Hanna
		Stephan Gonzalez, et. Al.	Stephan	Gonzalez
		Steve Paulson Jr. (Etux)	Steve Jr.	Paulson
		Dr. and Mrs. Karl Kubas & Jackie Jones	Karl Dr.	Kubas
		Michael Bates I, Michael Bates II, and Michael Bates III	Michael I	Bates

Situation	**Solution**	**E.g., Courthouse Listing of Owner (s)**	**E.g., FirstName Input**	**E.g., LastName Input**
Cannot find owner information	Enter ‘Cannot find’ in LastName	Unsure		Cannot find
		Could not locate owner		Cannot find
Miscellaneous examples		West Suburban Bank Trust #2272	Trust #2272	West Suburban Bank
		O.J. Tretter Trust #1	O J - Trust #1	Tretter
	Business contact name optional	Big 3 Precision – Dale R. Morrison		Big 3 Precision – Dale R Morrison
		William Owers Revocable Living Trust	William - Revocable Living Trust	Owers
		Enip’S Inc.		Enips Inc
		C & Lyahr 1989 Family Trust	1989 Family Trust	C and Lyahr
		Rex Chappelear Family Trust	Rex - Family Trust	Chappelear
		E. Lechien – Compound Land Trust	E - Compound Land Trust	Lechien
		Walter Land Trust	Land Trust	Walter

Regional Appendix C. Additional Northern Data Collection Procedures

This appendix covers items that are not fully explained in the main text of Sections 0 through 9.

C.1 ALTERNATE PLOTS (East/West)

A replacement plot (SK 3) is authorized when a remeasurement plot (SK 2) cannot be established due to inadequate plot records from the previous annual cycle. The SK 2 plot being replaced requires minimal data entry: PLOT STATUS = 3 (nonsampled) and NONSAMPLED REASON = 06 (lost plot).

C.2 DENIED ACCESS PROCEDURES

C.2.1 PREVIOUS DENIED ACCESS THAT IS NOW DESIGNATED NEW GROUND (SK 1)

These plots, with new ground designation, require all trees measured to receive the NEXT AVAILABLE TREE NUMBERS. This allows a break from the historical tree records.

If the plot was established in a previous Cycle in the field, the SK1 plot should be placed in the exact same location. Reference the previous crews plot map, reference information, and tally trees to locate the dowels or pins.

C.2.2 PROCEDURE FOR PLOTS THAT ARE DENIED ACCESS OR HAZARDOUS

For plots that are completely Denied Access or Hazardous, the MIDAS program will automatically populate some of the required variables and remove unnecessary variables. The Plot Level Data screen will need to be completed by the field crew. Once all Plot Level Data items have been populated, running the editor will populate all other necessary data items with exception of five remaining variables.

The Condition Level Data will populate everything except CONDITION NONSAMPLED REASON.

All four Subplots will populate everything except SUBPLOT NONSAMPLED REASON.

All existing remeasurement TREE records will receive a TREE STATUS of 0 and a RECONCILE of 9. All other Historical data items such as GPS Data, Boundary Data, and Site Index Data will be removed automatically from the data file.

C.3 REMEASUREMENT PLOTS (SK 2) NOT SAMPLED LAST CYCLE:

C.3.1 PREVIOUSLY PARTIALLY DENIED ACCESS OR PARTIALLY HAZARDOUS PLOTS

A reconcile code is required for trees on portions of plots that were not sampled during the last cycle due to access denied or hazardous conditions. If trees in these portions now become available for measure they will need a reconcile code. RECO 1 (ingrowth or reversions) is the best choice.

C.3.2 PREVIOUSLY PI NONFOREST NOW PI FOREST

Plots that have “Previous Field Plot?” = ‘N’ and a Sample Kind 2 on the current plot sheets were PI in the office as Nonforest last Cycle and now determined to possibly be forested in this Cycle.

If it turns out that this type of a plot has a Forested condition there will be several ways to define the trees depending upon the circumstances.

a. Previous PI of NF was Correct = RECO 1

If the plot has reverted from a Nonforest condition and the PI shop was correct in not sending the plot to the field previously, all of the trees will receive a RECO code of 1 (Ingrowth or reversions) regardless of size.

b. Previous PI of NF was Incorrect = RECO

If the plot contained forest land previously and should have been sent to the field, then the trees will be handled as either Missed or Ingrowth depending on their size. We are considering the PI process an inventory so if the plot should have been measured in the field previously; we are considering the trees that were present and of size last time as Missed. It will depend on the situation of the tree in order to determine the RECO code as follows:

- RECO = 1 (Ingrowth or reversions) If the DBH is near 5.0" for subplot or 1.0" for microplot and potentially grew onto the plot since last Cycle (size range will depend on growing condition of site). Live or dead currently.
- RECO = 2 (Through growth) will **RARELY** be used in NRS. Trees are unlikely to grow from seedling to 5.0 DBH in 5 yrs.
- RECO = 3 (Missed live) If the DBH exceeds the expected range of growth for Ingrowth for a Cycle (i.e. 9.5" DBH). This can apply to a dead tree if it can be determined the tree was live at time of previous measurement.
- RECO = 4 (Missed dead) If it is determined the tree was dead at time of previous measurement and is 5.0" or greater.

C.4 TREES ENTERED ON THE WRONG SUBPLOT

C.4.1 Trees Entered on the Wrong Subplot in Previous Cycle

Give all trees entered on the wrong subplot a **Status of '0' (No Status)** and a **Reconcile of '7' (Cruiser Error)**. Then all of the previously measured trees will be tallied on their correct subplot as **Reconcile '3' (Missed Live)** or **Reconcile '4' (Missed Dead)**. Be sure to write notes to explain the situation.

All trees that did not meet size requirements previously will receive **Reconcile '1' (Ingrowth)**. If a tree was less than 5.0" or 1.0" previously and now is of size it wouldn't be considered missed and would be tallied as a new tree.

NOTE: This situation was handled differently in the past, so be sure to follow these new guidelines.

C.4.2 Tree Entered on the Wrong Subplot in Current Cycle

If trees were tallied on the wrong subplot during the current inventory, they can easily be adjusted at the St. Paul level. If the plot is **SK 1** or a **Reverting Condition** and the newly measured trees were entered on the wrong subplot send the data file to St. Paul via email with a note of what subplots to shift. Also include if the subplot data, seedling data, and/or boundary data needs shifting. Adjustments can be made on the subplots within the data file so the trees will be loaded correctly the first time.

C.5 RESERVED LAND (documentation)

All public land (federal, state or local) requires documentation in the PLOT NOTES of RESERVED STATUS. The reserved designation removes the associated forest into noncommercial forest land. Example:

- RESERVED STATUS = 1, Allegheny National Forest – Hickory Creek Wilderness Area
  Source – J. Smith, ANF

- RESEVED STATUS = 0, Bald Eagle State Forest
  Source – S. Jones, PA Bureau of Forestry

State supervisors may be able to provide a list of public lands that qualify as reserved. The web based source Wilderness.net lists wilderness areas that may be found on Forest Service, Fish and Wildlife Service, National Park Service and the Bureau of Land Management. A public entity may also have GIS layers showing public land protected by law.

C.6 CONDITION CHANGE FROM FOREST TO NONFOREST (required entries)

If the current condition of previous tally trees converts from forest to nonforest between cycles, the following data is required on trees now in a nonforest condition.

Site Index data is downloaded, so if the entire plot is now nonforest, it will need to be deleted to avoid errors relating to SI. If a portion of the plot is forested, make sure only forest conditions are in the CONDITION CLASS list.

Tree and Sapling requirements for previously tallied trees now on nonforest condition:

- TREE RECORD NUMBER – Download
- PRESENT TREE STATUS
- PREVIOUS TREE STATUS – Download
- RECONCILE, if PRESENT TREE STATUS = 0
- HORIZONTAL DISTANCE – Download
- PREVIOUS DBH – Download
- SPECIES – Download
- AZIMUTH – Download
- CONDITION CLASS NUMBER
- STANDING DEAD, if PRESENT TREE STATUS = 2
- CAUSE OF DEATH

Ingrowth trees are not tallied. **Missed** trees from the last cycle are not to be reconciled, since the collection of this data is subjective due to the condition change. **Erroneously tallied** trees from the last cycle can be reconciled if it is determined that a cruiser error or a procedural change has taken place since the last cycle.

NRS PDR Note: To prevent trees from mistakenly being coded on a non-forest condition, each tree will receive the following critical PDR message: "You have a tree on a non-forest condition. This is only valid if condition went from forest to non-forest."

C.7 RECONCILING THE PREVIOUS TALLY

On remeasurement plots (SK 2), the trees that fall on any of the four subplots or microplots will be reconciled to itself from the previous inventory based on azimuth, distance, ect. Only trees 5.0

inches DBH and greater within the 24.0 ft subplot radius will be tallied and reconciled. Also, only trees 1.0 to 4.9 inches DBH within the 6.8 ft microplot radius will be tallied and reconciled. All trees that are further than 24.0 ft or 6.8 ft, respectively, away from subplot center will be ignored.

National Appendix 8 shows tree coding for many situations. Refer to this appendix for proper coding. If you are still unsure on how to code a tree, contact your supervisor.

The following examples are common, simple situations. A correct reconciliation may be time demanding and complex. However, this is a critical part of the inventory. Training will be provided. Crews are to direct any questions to supervisors as soon as possible**.**

Examples:

1. The first tree to be tallied at subplot 1 is now an ingrowth, dead ingrowth, or previously missed tree. Assign the first available tree number and record the appropriate current data. If the highest tree number was previously #35 on this subplot the last time, assign this tree #36. Tree #36 will receive PRESENT TREE STATUS = 1 or 2 and RECONCILE = 1, 3 or 4.

   The next tree tallied was tree #1 at the last inventory. Since trees are no longer being renumbered each inventory, previous tally tree #1 is current tree #1.

2. The first tree on the old plot record was a 24.0-inch DBH sugar maple, followed by an 8.0-inch DBH beech. The beech is present and is the first live tree starting from an azimuth of 001. There is no evidence of the sugar maple. Check the area to the plot radius limit to see if there is a stump of the maple. Perhaps there is -- perhaps not. In this case, tree is dead and down. The maple was, and still is, tree #1 and receives PRESENT TREE STATUS = 2 and STANDING DEAD = 0. The beech tree is tree #2 and is still present and receives PRESENT TREE STATUS = 1.

C.8 QAQC PLOT DESIGNATIONS

Quality Assessment / Quality Control (QAQC) is required for the office Photo Interpretation (PI) plots just as QAQC is required for P2/P3 plots that are completed in the field. 4% of all plots PI'ed in the office are reviewed a second time by another office staff to evaluate repeatability. Of those 4%, any plots that were determined to contain forest land by both PI crews will be sent out as a **Mandatory Field P2 / P3 QAQC**. Of the 4% that were determined to be nonforest, up to 25 total plots will be sent out per state as **QAQC P1** plots. Lastly, any of the 4% that had a discrepancy between the two PI checks in forest/nonforest calls will be sent out as **QAQC Special**.

- **Mandatory Field QAQC** plots require a second visit in the field by a QAQC crewmember. (Additional Field QAQC checks may also be performed)

- **QAQC P1** plots are thought to be nonforest by both QA crews. The fieldcrew must visit the area to complete a visual check to verify. It is not a requirement to visit PC if the site is clearly nonforest. If the status is in question or the site is not visible from a convenient location, the site must be visited. A stocking check may be necessary to determine the status.

- **QAQC Special** plots had a discrepancy between the PI crews. The fieldcrew must visit the area to complete a visual check to verify. It is not a requirement to visit PC if the site is clearly nonforest. If the status is in question or the site is not visible from a convenient location, the site must be visited. A stocking check may be necessary to determine the status.

A **Starting Point** is required, along with SP coordinates, for all **QAQC P1** and **QAQC Special** plots. If PC is not visited, PC coordinates are not required. Do not enter coordinates that are printed on the plotsheet. Only enter PC coordinates if PC was visited or if the Offset function is used. **GPS Type** should be coded as ‘0’ and all other GPS data items left blank if no GPS data are collected.

If a forested condition is present on **QAQC P1** or **QAQC Special** plots, only some of the plot data items are required. All **Plot**, **Condition**, **Subplot**, and **Boundary** data are required. **Trees**, **Seedlings**, **Invasives**, and **Site Index trees** data are not required because this is a QAQC plot on the PI call and this info was not collected at the office level. Next subcycle this plot will go out as a production P2/P3 plot.

Note: It is important to code Subplot Status as ‘4’ (*Sampled – QA crew did not measure trees, saplings, seedlings, or invasives. QA crew did measure all other data items.*) if a forested condition is present and the above items are not collected. A Subplot Status code of ‘4’ indicates these items may be present but were not considered for this type of QA plot.

C.9 CODING UNDERSTORY VEGETATION AS A DISTURBANCE

When coding understory vegetation as a disturbance, consider how this vegetation is affecting the stand as a whole. The following are a few examples as to how the stand size class and composition may affect the decision.

STAND SIZE CLASS = 3 (sawtimber < 20”) Oak stand in WV with a thick understory of Rhododendron and few seedlings

- The Rhododendron is native, but both native and invasive plants can cause a disturbance.
- The Rhododendron may or may not be the reason new seedlings are not being established in the stand but does this vegetation affect the stand of 13 inch Oaks enough to code a disturbance? No.
- So in this case, we would **not code** this understory vegetation as a disturbance.

STAND SIZE CLASS = 3 (sawtimber < 20”) Maple stand in PA before and after a harvest

- A healthy stand of Maple with no seedlings possibly due to the lack of a seed source or a thick layer of understory vegetation. Either way there would be **no** disturbance since the overall condition of these size class 3 Maples is good.
- The stand is next visited a year or two after major harvest. The entire area is covered with thick Raspberry plants and there are a few Maples slowly sprouting under the Raspberry. This Raspberry seems to be affecting both the establishment and growth of these seedlings. In this case we **do** have a disturbance.
- On the next visit, five years later, the Maple seedlings are growing into saplings and starting to shade out the berry bushes. In this case the Raspberries are no longer a factor so we would not code them as an understory vegetation disturbance.

If you feel that the Raspberry is affecting this new stand take the following into consideration prior to coding a disturbance:

- How thick is the competing vegetation? If you were able to look down from above would there be significant gaps?

- Look at the stand as a whole and not as small localized pockets.

- Do you see a fair amount of seedling growth intermixed within the berries?

- Is lack of establishment of new seedlings due to something other than the competing vegetation, such as lack of an adequate seed source?

- Is at least one acre of the stand affected?

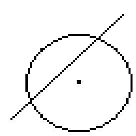
If one or more of these conditions creates a debate as to whether the competing vegetation is affecting 25% of the area or not, it may not qualify as a Disturbance

C.10 SPLIT SUBPLOTS

Consider the following when a subplot has both an accessible condition and non-accessible condition present.

➢ If subplot center cannot be occupied due to Denied Access (DA), Hazardous (Haz), or inaccessible water condition, **code the whole subplot DA or Haz** . No boundary would be measured. If any other subplots are accessible on the plot, they would be measured.

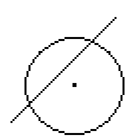
Accessible Condition



DA or Haz or Inaccessible Water Condition

➢ If subplot center is accessible but a portion of the plot is DA, Haz, or Inaccessible water; collect the data on the accessible portion and **map a boundary** for the DA, Haz, or water area. If it is water, define the area as noncenses or censes water.

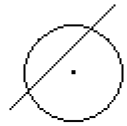
DA or Haz or
Inaccessible Water Condition



Accessible Condition

➢ If the DA area of an accessible subplot is clearly visible as a Nonforest condition, **define the DA area as Nonforest**. Since there is no requirement to physically access the property to determine that it is Nonforest, there is no need to code it as DA.

DA – Nonforest Area
Define as Nonforest



Accessible Condition

If all of a subplot has been DA but is clearly Nonforest, **code the subplot as Nonforest**. There is no requirement to physically access the property if it can be visually defined.

If a complete subplot falls in Census or Noncensus water **code the whole subplot as water**. Since we know the entire subplot is contained within water we want to define it as such.

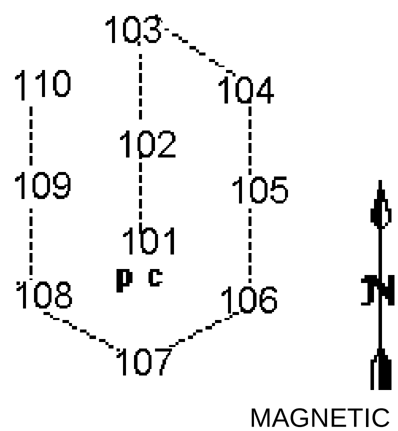
The reason behind **not** mapping a boundary when the subplot center is inaccessible is we do not want to estimate the boundary information and then estimate what trees will be in or out of the subplot.

C.11 OLD NC VARIABLE RADIUS PERIODIC PLOT

The old variable radius plot consisted of 10 prism points from the last periodic inventory. The layout of these points is shown in Figure 9. 101's PC is the same as subplot center number 1 of the current P2 plot design. All of the old points consisted of a variable radius (37.5 BAF) plot to sample trees 5.0 inches and larger and a fixed radius micro plot (6.8 ft. radius) to sample trees less than 5.0 inches. Monumentation remains for this old 10 point cluster so don't be confused by the paint, pins, or tree tags that may be present.

Figure 9. Old variable radius plot layout.

From subplot center	70' to subplot center	Azimuth
101	102	0^{o}
102	103	0^{o}
103	104	120^{o}
104	105	180^{o}
105	106	180^{o}
106	107	240^{o}
107	108	300^{o}
108	109	0^{o}
109	110	0^{o}



C.12 PREVIOUS LAND USE CODES FOR REFERENCE ONLY – DO NOT APPLY THESE CODES

The following is a listing of the former North Central and Northeast land use codes from regional guide's version 3.0. **These codes are not valid for version 5.0, but are for reference only.**

NORTHEAST FIELD GUIDE, VERSION 3.0			
CONDITION CLASS STATUS = 1		CONDITION CLASS STATUS = 2	
Commercial Forest Land		Nonforest Land	
20	Timberland	61	Cropland
30	Other forest land	63	Pasture
52	Urban forest land	65	Idle farmland
		67	Other agriculture
Noncommercial Forest Land		69	Wetlands
31	Unproductive other forest land	73	Rights-of-way
32	Reserved other forest land	75	Mining and waste land
33	Unproductive reserved other forest land	77	Developed recreation
40	Unproductive forest land	79	Industrial and commercial land
41	Unproductive reserved forest land	81	Residential
50	Reserved forest land	85	Other nonforest
		87	Christmas tree plantations or farms

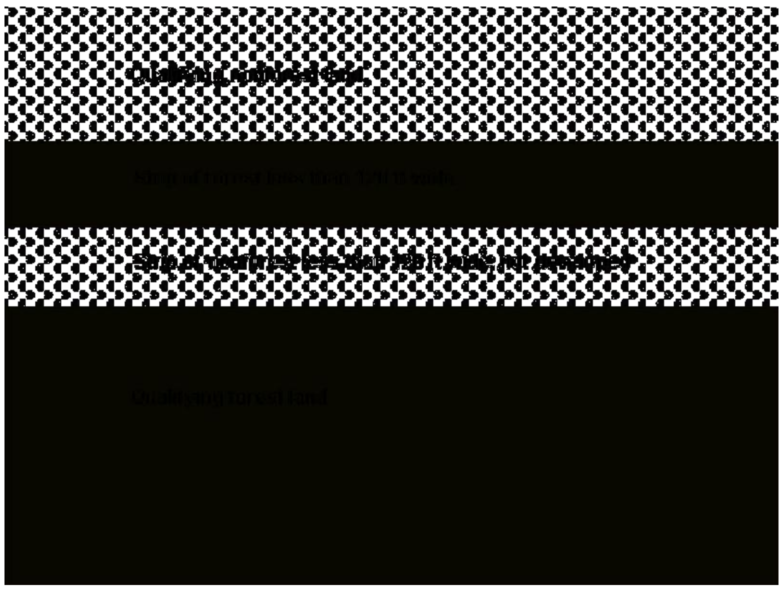
NORTH CENTRAL FIELD GUIDE, VERSION 3.0	
Code	NC Land Use
20	Timberland
21	Pastured Timberland
22	Plantations
40	Unproductive forest land
41	Reserved forest land-unproductive
45	Reserved forest land-productive
57	Wide windbreaks (> 120')
59	Wooded pasture
46	Christmas tree plantations
50	Reserved nonforest with trees
51	Cropland with trees
52	Improved pasture w/ trees
53	Wooded strip (natural)
54	Idle farmland with trees
55	Marsh with trees
56	Narrow windbreaks (< 120')
58	Shelterbelt
71	Urban forest land
72	Urban and other with trees
61	Cropland
62	Improved pasture
64	Idle farmland
65	Marsh
66	Other farmland
67	Urban and other areas
68	Rights-of-way
69	Nonforest (reserved)
79	In another country
80	Noncensus water

89	Noncensus water (reserved)
90	Census water
96	Inaccessible
99	Denied access

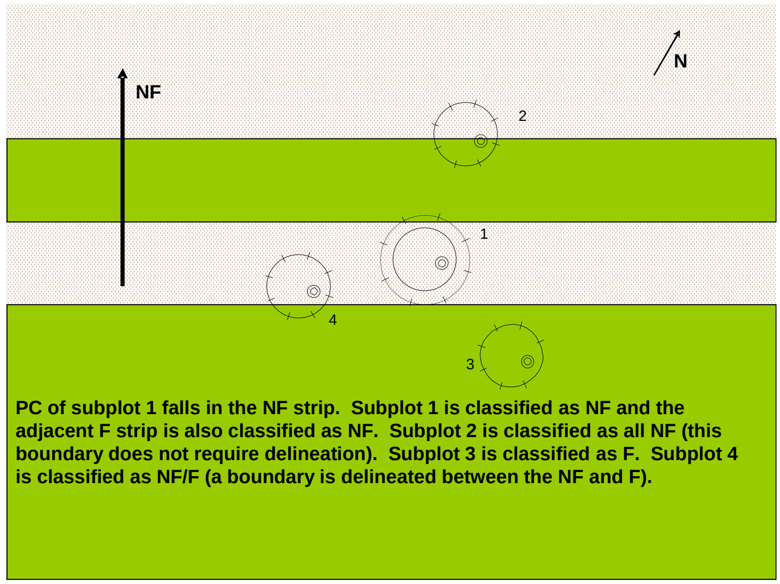
C.13 TWO ALTERNATING STRIPS – Figure 7b+N, Section 2.4

On the following pages are 4 examples on how to apply" Exception Rule 7b" for two alternating strips of forest and nonforest between two qualifying areas of nonforest land and forest land (From Section 2.4). The <u>nonforest strip</u> for Figure 7b+N <u>is not developed or noncensus water</u> and both the forest strip and the nonforest strip are at least 30 ft and less than 120 ft wide and 1 acre in size. If either strip does not meet these dimensions, then the strip is treated as an inclusion of the adjacent condition. Note: Not all plot scenarios are shown.

From Figure 7b+N, Section 2.4

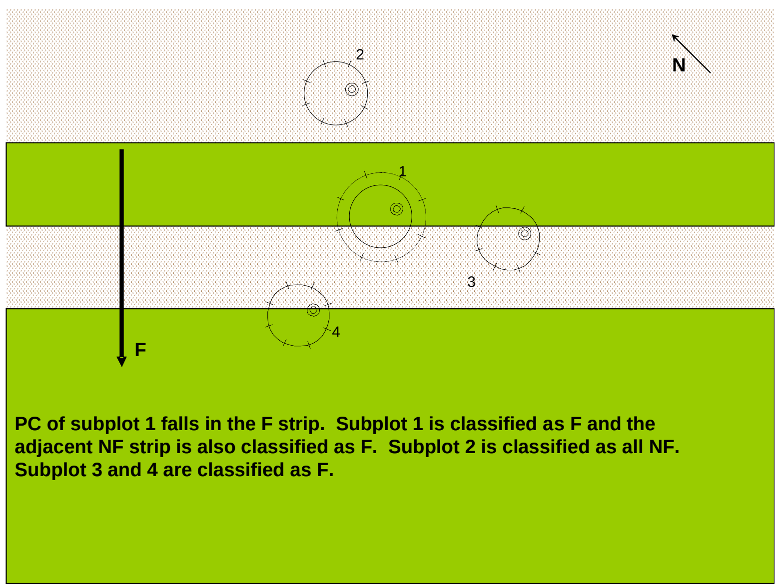


Example 1



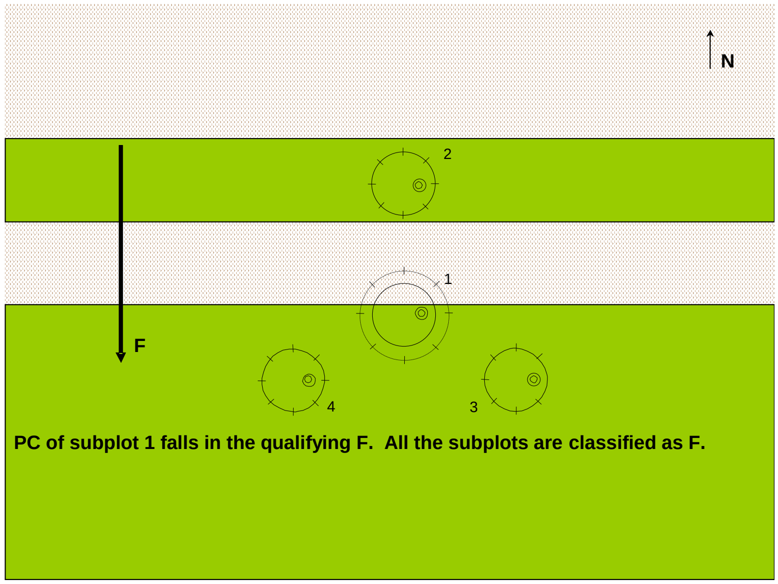
PC of subplot 1 falls in the NF strip. Subplot 1 is classified as NF and the adjacent F strip is also classified as NF. Subplot 2 is classified as all NF (this boundary does not require delineation). Subplot 3 is classified as F. Subplot 4 is classified as NF/F (a boundary is delineated between the NF and F).

Example 2

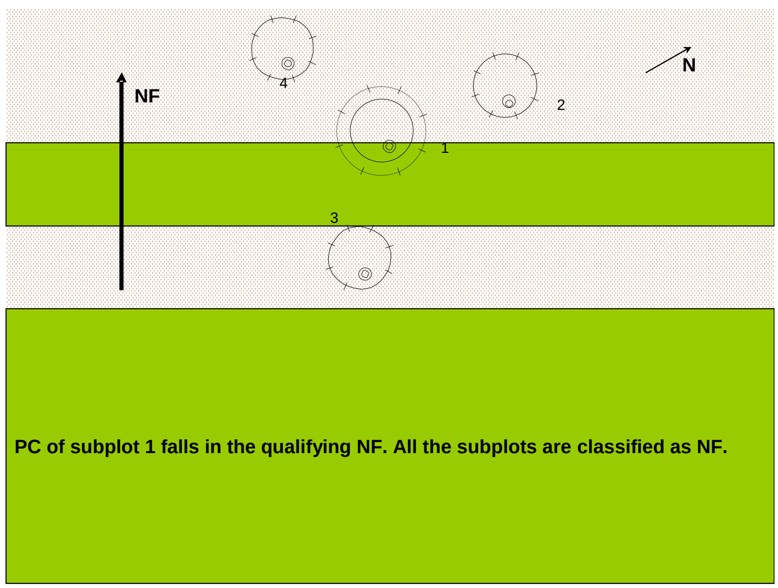


PC of subplot 1 falls in the F strip. Subplot 1 is classified as F and the adjacent NF strip is also classified as F. Subplot 2 is classified as all NF. Subplot 3 and 4 are classified as F.

Example 3



Example 4



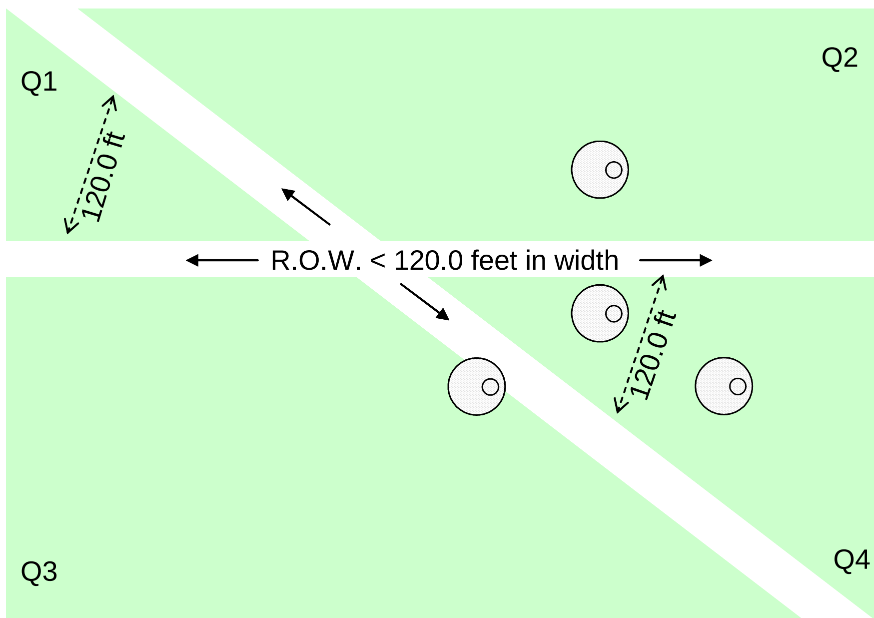
C.14 "SWITCHBACK" RULE – Figure 5, Section 2.4

The following illustrations show examples of how to apply the "switchback" rule from Section 2.4, Figure 5 in the North. Switchbacks are not common in the northern region, but other situations that resemble switchbacks can be found like crisscrossing roads or oxbows formed by waterways that exist in large tracts of forest. The "switchback" rule, if properly applied, reduces forest fragmentation caused by R.O.W., other "developed" conditions, and noncensus linear water features that are less than 120.0 feet wide that exist within accessible forest land.

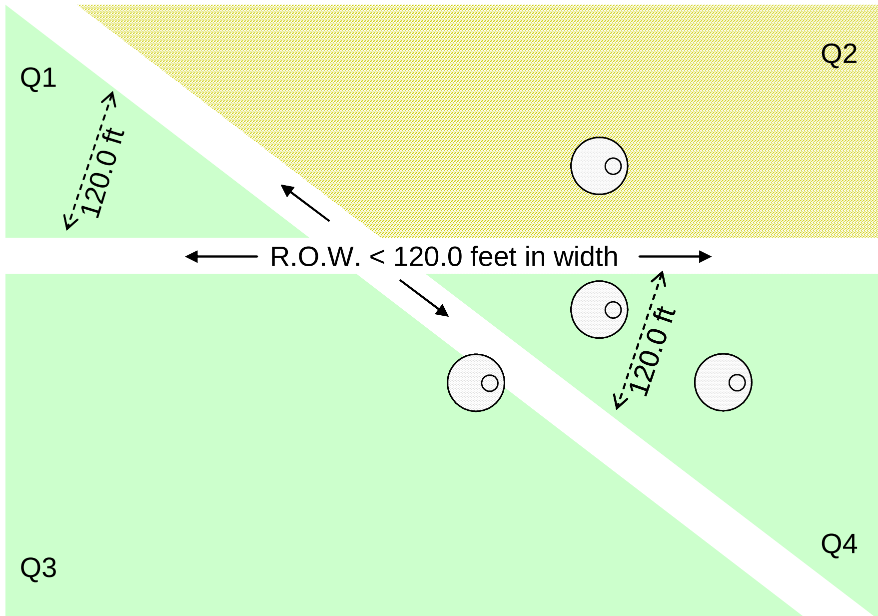
The key to understanding the "switchback" rule is that the questionable subplot **MUST BE** within a parcel of forest that qualifies as accessible forest land and there must be one opposing parcel on the opposite side of the nonforest strip that also qualifies as accessible forest land.

Note: If there ever is any doubt as to whether or not a parcel qualifies as forest land, it is better to err on the side of forest land and contact your supervisor to discuss the unique plot situation.

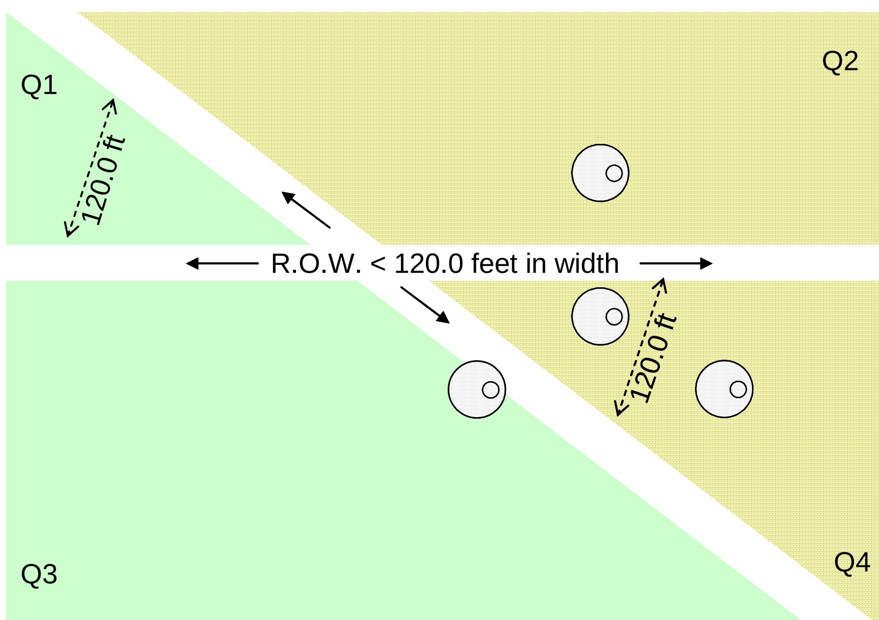
In this illustration the plot falls in a parcel of forest represented by sub-parcels Q1 through Q4. Each sub-parcel meets the minimum specifications for accessible forest land that is 120.0 ft wide and at least 1 acre. Applying the "switchback" rule, subplot 1 can be classified as accessible forest land. Note that "120.0 feet and less than 90 degree" rule (see Section 2.2, Figure 2) does not apply to subplot 1 since the sub-parcels Q2, Q3 and Q4 are accessible forestland. At subplot 4, the nonforest condition created by the R.O.W. is recorded and delineated.



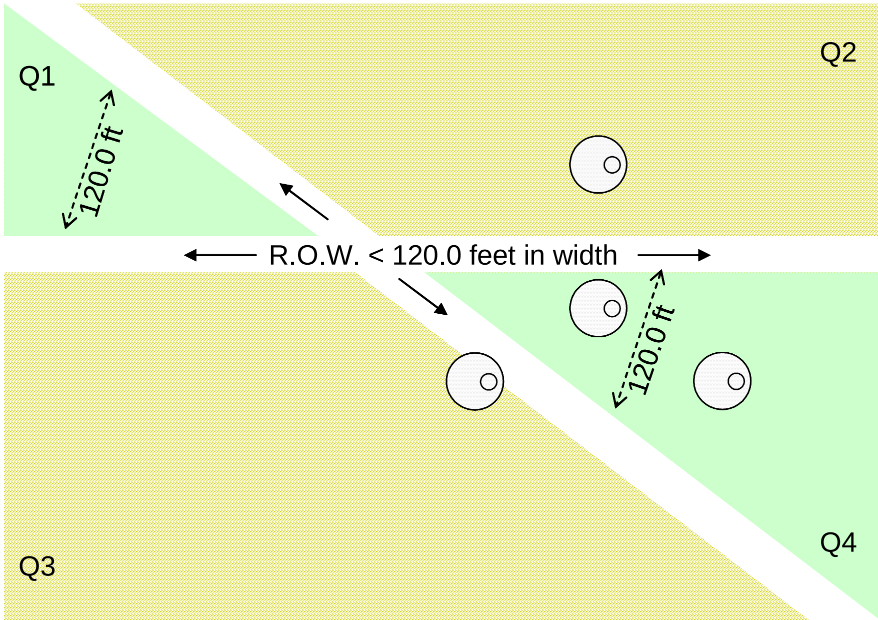
In this next illustration the plot falls in a parcel of forest represented by sub-parcels Q1, Q3 and Q4. Q2 is nonforest. Sub-parcels Q1, Q3 and Q4 meet the minimum specifications for accessible forest land. Sub-parcel Q2 qualifies as nonforest land. Applying the "switchback" rule, subplot 1 can still be classified as accessible forest land. Note that "120.0 feet and less than 90 degree" rule does not apply to subplot 1 since the sub-parcel Q3 and Q4 are accessible forestland. Subplot 2 is classified as nonforest. At subplot 4, the R.O.W. is delineated as nonforest.



In this illustration the plot falls in a parcel of forest represented by sub-parcel Q1 and Q3. Q2 and Q4 are nonforest. Sub-parcels Q1 and Q3 meet the minimum specifications for accessible forest land. Sub-parcel Q2 and Q4 qualifies as nonforest land. Subplots 1 through 3 are classified as nonforest. Subplot 4 is classified as forest and the R.O.W. is delineated as nonforest.



In this final illustration the plot falls in a parcel of forest represented by sub-parcel Q1 and Q4. Q2 and Q3 are nonforest. Sub-parcels Q1 and Q4 meet the minimum specifications for accessible forest land. Note that "120.0 feet and less than 90 degree" rule now applies to subplot 1 since the sub-parcel Q2 and Q3 are nonforest. Subplot 1, 2 and 4 are classified as nonforest. At subplot 4 the entire plot is classified as a single nonforest land use since delineation is not required between nonforest land uses. Subplot 3 is classified as forest.



Regional Appendix D. State / Species Specific Data Collection Variables and Procedures

STATE = 23

2.5.22.2N-ME STAND STRUCTURE **[MEST]**

Record the code describing the basic stand structure of the trees in the condition. This attribute is ancillary, that is, contrasting conditions are never delineated based on variation in this attribute.

When collected: STATE = 23 and CONDITION CLASS STATUS = 1
Field width: 1 digit
Tolerance: No errors
MQO: At least 99% of the time
Values:

1 Single-storied: stands characterized by an even canopy of uniform height with close competition between trees. The smaller trees are usually members of the stand that were stressed or overtopped and have fallen behind their associates. Regeneration and/or tall relics from a previous stand may be present. Most of the trees in the condition are within the height class of the average stand height.

2 Two-storied: stands composed of two relatively even but distinct canopy layers, such as a mature overstory with an understory sapling layer, possibly from seed tree and shelterwood operations, or an overstory of tall conifers with an understory of low hardwoods. Neither canopy is necessarily continuous or closed, but both canopy levels tend to be uniformly distributed across the stand. Each canopy level must cover at least 25 percent of the condition.

3 Multi-storied: stands generally containing trees from every size group on a continuum from seedlings to mature trees and are characterized by a broken or uneven canopy layer. Usually the largest number of trees is in the smaller diameter classes. Consider any stand with three or more structural layers as multi-storied if each of the three or more layers covers at least 25 percent of the condition.

4 Mosaic: stands contain at least two distinct size classes each of which covers at least 25 percent of the condition; however, these classes are not uniformly distributed but are grouped in small repeating aggregations, or occur in stringers less than 120.0 ft. (36.6 m.) wide, throughout the stand. Each size class aggregation is too small to be recognized and mapped as an individual stand; the aggregations may or may not be single-storied

5 Nonstocked: Less than 10-percent tree stocking present.

3.10.1N-ME CROWN CLOSURE **[MECC]**

Estimate the percent of the subplot that is covered by live trees directly overhead and record the appropriate code. If foliage is not present due to seasonal variation or temporary defoliation, visualize the amount of live crown that would normally be present.

When collected: STATE = 23 and SUBPLOT STATUS = 1
Field width: 1 digit
Tolerance: +/- 1 class
MQO: At least 90% of the time
Values:

0	0 to 25%
1	26 to 50%
2	51 to 75%
3	> 75%

NRS Note to ME data collectors: Maine collects shrub and vine data on MICROPLOTS 1 – 4.

6.5N-ME SHRUB AND VINE DATA FOR THE MAINE INVENTORY

Additional vegetation information is obtained by counting live shrubs, dwarf shrubs and vines within the 3.7 foot radius microplot located 90 degrees and 12.0 feet from each subplot center within each of the four subplots. Only count live shrubs, dwarf shrubs and vines occurring in accessible forest land.

6.5.1N-ME SUBPLOT NUMBER

Use the procedures outlined in Section 3.1.

NRS PDR Note: This variable is determined by the subplot selection in the PDR program.

When Collected: STATE = 23 and CONDITION CLASS STATUS =1 for all counts of live shrubs, dwarf shrubs and vines

6.5.2N-ME SHRUB AND VINE SPECIES **[SPP]**

Record the appropriate SPECIES code from the list in Appendix F. If you encounter a species not listed in Appendix F and are not sure if it should be tallied, consult your supervisor. If the species cannot be determined in the field, tally the shrub or vine, but bring branch samples, foliage, cones, flowers, bark, etc. to your supervisor for identification. If possible collect samples outside the subplots form similar specimens and make a note to correct the SPECIES code later. Use the UNKNOWN or generic SPECIES code only when you encounter a shrub or vine where you know the species but the species is not on the species list.

When Collected: STATE = 23 and CONDITION CLASS STATUS = 1 for all counts of live shrubs, dwarf shrubs and vines
Field width: 4 digits (9xxx)
Tolerance: No errors for genus, no error for species
MQO: At least 90% of the time for genus, at least 85% of the time for species
Values: See Shrub and Vine list after SHRUB COUNT

6.5.3N-ME CONDITION CLASS NUMBER **[CON#]**

Use the procedures outlined in Section 2.0.

When Collected: STATE = 23 and CONDITION CLASS STATUS = 1 for all counts of live shrubs, dwarf shrubs and vines

6.5.4N-ME SHRUB COUNT **[SHRU]**

On each 3.7 foot radius microplot, record the number of live deciduous and evergreen shrubs by SPECIES and CONDITION CLASS NUMBER. Count up to 5 individuals by species; estimate the total count if more than 5 individuals but less than 50 of any given species in any given condition class. If the estimated count exceeds 49, then record 50. Shrubs must be at least 12.0 inches in length in order to qualify for counting.

Dwarf shrubs and vines are tallied by occurrence and condition class. Individual counts of specimens are not required for these life forms.

When Collected: SPP = deciduous shrub code or evergreen shrub code
Field width: 2 digits
Tolerance: No errors for 5 or less per species; =/- 20% over a count of 5
MQO: At least 90% of the time
Values: 01 to 50

SHRUB AND VINE SPECIES CODES FOR MAINE

DECIDUOUS SHRUBS

Code	**PLANTS00**	**Common name**	**Genus**	**Species**
9350	ALNUS	**Alder spp.**	**Alnus**	**spp.**
9352	ALINR	speckled alder	A.	incana ssp. rugosa (rugosa)
9353	ARSP2	Hercules club	Aralia	spinosa
9365	**PHOTI**	**chokeberry spp.**	**Photinia (Aronia)**	**spp.**
9366	**RHODO**	**azalea spp.**	**Rhododendron (Azalea)**	**spp.**
9368	**BERBE**	**barberry spp.**	**Berberis**	**spp.**
9381	CEOC2	buttonbush	Cephalanthus	occidentalis
9458	CEAM	New Jersey tea	Ceanothus	americanus
9465	CLAL3	sweet pepperbush	Clethra	alnifolia
9475	CHVI3	fringetree	Chionanthus	virginicus
9485	COPE80	sweetfern	Comptonia	peregrina
9492	COAL2	alternate-leaved dogwood	Cornus	alternifolia
9493	COAM2	silky dogwood	C.	amomum (obliqua)
9494	CORU	round-leaved dogwood	C.	rugosa (circinata)
9496	CORA6	gray-stemmed/panicled dogwood	C.	racemosa (paniculata)
9497	COSES	red-osier dogwood	C.	sericea ssp. sericea (stolonifera)
9501	COAM3	American hazelnut	Corylus	americana
9502	COCO6	beaked hazelnut	C.	cornuta (rostrata)
9525	DIPA9	leatherwood	Dirca	palustris
9535	ELAEA	autumn olive	Elaeagnus	umbellata
9549	**GAYLU**	**huckleberry spp.**	**Gaylussacia**	**spp.**
9585	HAVI4	witch-hazel	Hamamelis	virginiana
9592	ILMO	large-leaf holly	Ilex	montana (monticola)
9593	ILVE	winterberry holly	Ilex	verticillata
9604	**LEUCO5**	**fetter-bush spp.**	**Leucothoe**	**spp.**
9609	LIBE3	common spicebush	Lindera	benzoin
9635	**LONIC**	**bush honeysuckle spp.**	**Lonicera**	**spp.**
9637	**LYONI**	**male-berry, staggerbush spp.**	**Lyonia**	**spp.**
9643	MYGA	sweet gale	Myrica	gale
9644	MOPE6	bayberry	Morella (Myrica)	pensylvanica
9685	NEMU2	mountain-holly	Nemopanthus	mucronatus
9725	PHOP	ninebark	Physocarpus	opulifolius
9845	**RHAMN**	**buckthorn spp.**	**Rhamnus**	**spp.**
9856	**RHODO**	**azalea (deciduous) spp.**	**Rhododendron (Azalea)**	**spp.**
9864	RHCO	winged sumac	Rhus	copallinum
9865	RHGL	smooth sumac	R.	glabra
9866	RHHI2	staghorn sumac	R.	hirta (typhina)
9868	TOVE	poison sumac	Toxicodendron (Rhus)	vernix
9870	**RIBES**	**currant, gooseberry spp.**	**Ribes**	**spp.**
9905	**ROSA5**	**Rose spp.**	**Rosa**	**spp.**
9915	**RUBUS**	**briar, bramble, dewberry spp.**	**Rubus**	**spp.**
9925	SANIC4	American elderberry	Sambucus	nigra ssp. canadensis (canadensis)

Code	PLANTS00	Common name	Genus	Species
9926	SARA2	red-berried elderberry	S.	racemosa
9929	**SALIX**	**shrub willows spp. (all other willows not indicated in tree codes**	**Salix**	**spp.**
9937	**SPIRA**	**spirea spp.**	**Spiraea**	**spp.**
9982	STTR	American bladdernut	Staphylea	trifolia
9983	**VACCI**	**Blueberry spp.**	**Vaccinium**	**spp.**
9985	**VIBUR**	**Viburnum spp.**	**Viburnum**	**spp.**
9986	VIAC	maple-leaved viburnum	V.	acerifolium
9987	VILA11	hobblebush viburnum	V.	lantanoides (alnifolium)
9988	VINUC	wild raisin, withe-rod	V.	nudum var. cassinoides (cassinoides)
9989	VIDE	arrowwood	V.	dentatum
9990	VILE	nannyberry	V.	lentago
9991	VIPR	blackhaw	V.	prunifolium
9992	VIOPA2	highbush cranberry	V.	opulus var. americanum (trilobum)
9994	ZAAM	common prickly-ash	Zanthoxylum	americanum
9997	**2SD**	**unknown or not listed**		

If species is not listed, use generic genus code.

EVERGREEN SHRUBS

Code	PLANTS00	Common Name	Genus	Species
9045	CHCA2	leatherleaf	Chamaedaphne	calyculata
9061	JUCO6	common juniper	Juniperus	communis
9232	TACA7	Canada yew	Taxus	canadensis
9357	ANPOG	bog rosemary	Andromeda	polifolia var. glaucophylla (glaucophylla)
9605	KAAN	sheep laurel	Kalmia	angustifolia
9606	KALA	mountain laurel	K.	latifolia
9607	KAPO	swamp laurel	K.	polifolia
9608	LEGR	Labrador tea	Ledum	groenlandicum
9642	MOCE2	wax myrtle	Morella (Myrica)	cerifera
9855	**RHODO**	**rhododendron spp.**	**Rhododendron**	**spp.**
9945	SYTI	sweetleaf	Symplocos	tinctoria
9998	**2SE**	**unknown or not listed**		

If species is not listed, use generic genus code.

DWARF SHRUBS

Code	PLANTS00	Common Name	Genus	Species
9363	ARUV	bearberry	Arctostaphylos	uva-ursi
9364	ARAL2	alpine bearberry	Arctostaphylos	alpinus
9441	CHMA3	striped pipsissewa	Chimaphila	maculata
9442	CHUM	pipsissewa	Chimaphila	unbellata ssp. cisatlantica
9498	COCA13	bunchberry	Cornus	canadensis

9547	GAHI2	creeping snowberry	Gaultheria (Chiogenes)	hispidula
9548	GAPR2	teaberry	Gaultheria	procumbens
9603	DILA	diapensia	Diapensia	lapponica
9615	LIBO3	twinflower	Linnaea	borealis ssp. americana
9618	LOPR	alpine azalea	Loiseleuria	procumbens
9675	MIRE	partridgeberry	Mitchella	repens
9677	SITR3	three-toothed cinquefoil	Sibbaldiopsis (Potentilla)	tridentata
9981	**VACCI**	**cranberry spp.**	**Vaccinium**	**spp.**
9996	**2SUBS**	**unknown or not listed**		

If species is not listed, use generic genus code.

VINES

Code	**PLANTS00**	**Common Name**	**Genus**	**Species**
9451	AMBR2	hog peanut	Amphicarpaea	bracteata
9454	APAM	ground-nut	Apios	americana
9455	CESC	American bittersweet	Celastrus	scandens
9477	**CLEMA**	**clematis sp.**	**Clematis**	**spp.**
9636	**LONIC**	**vine honeysuckle**	**Lonicera**	**spp.**
9715	PAQU2	Virginia creeper	Parthenocissus	quinquefolia
9867	TORAR	poison ivy	Toxicodendron (Rhus)	radicans ssp. radicans (radicans)
9934	**SMILA2**	**Greenbrier spp.**	**Smilax**	**spp.**
9993	**VITIS**	**Grape spp.**	**Vitis**	**spp.**
9995	**2V**	**unknown or not listed**		

If species is not listed, use generic genus code.

6.5.5N-ME SAWLOG LENGTH **[SAW]**

Record sawlog length to the last whole foot of all sawtimber-sized trees that contain at least one 12 foot log, two non-contiguous 8 foot logs, or more and are classified as TREE CLASS = 2 or 5. The measurement begins from a 1 foot stump to a minimum top sawlog diameter: 9.0 inch DOB (diameter outside bark) for hardwoods and 7.0 inch DOB for softwoods.

- For trees that fork only use one stem when determining sawlog length (i.e., follow the stem yielding the most merchantable volume).
- **Live** tree with **live** broken top with **more than 50% detachment** from the tree but is minimally attached – SAWLOG LENGTH is taken through or past the break to the minimum 7.0 in. or 9.0 top DOB
- **Live** tree with **dead** broken top with **more than 50% detachment** from the tree – SAWLOG LENGTH does not extend beyond the break.
- **Dead** tree with **dead** broken top with **more than 50% detachment** from the tree – SAWLOG LENGTH does not extend beyond the break.
- **Dead** tree with **dead** broken top with **less than or equal to 50% detachment** from the tree – SAWLOG LENGTH is taken through or past the break to the minimum 7.0 in. or 9.0 in. top DOB.

When Collected: STATE = 23: All TREE CLASS 2 ≥ 11.0 in DBH hardwoods or ≥ 9.0 in DBH softwoods
Field Width: 2 digits
Tolerance: +/- 4 feet for trees ≤ 40 feet, or +/- 10% of true length for trees > 40 feet
MQO: At least 90% of the time
Values: 12 to 99

6.5.6N-ME % ROUGH BOARD-FOOT CULL **[BRGH]**

Rough board-foot cull is the volume within the recorded SAWLOG LENGTH that cannot be used to produce boards, because of forks, sweep, crook, large limbs and other sound defects. The total board-foot cull also includes the entire volume of sections that do not meet the minimum size, length and grade requirements. Estimate the percent rough cull volume by using the appropriate board-foot volume cull estimating aid table for either hardwoods or softwoods found in Regional Appendix E. Record the actual percentage of rough board-foot cull.

To determine the amount of rough board-foot cull, it is necessary to visually divide the recorded SAWLOG LENGTH into sections that are 8 feet or longer. The amount of rough cull to be recorded is the total volume of the sawlog length that does not qualify as logs. These are:

- Fork – A fork must be at least 1/3 the diameter of the main stem and branch out from the main stem at 45 degrees or less.
- Excessive sweep or crook – To determine if the sweep or crook exceeds the maximum allowed; refer to the sweep or crook deduction tables in Regional Appendix E.
- Sections less than 8 feet in length below a rough "stopper."
- Sections 8 feet in length or longer that do not meet minimum grading specifications.

Logs in the upper portion of the tree, determining the grade is difficult. For hardwoods, simply make sure the log appears to meet the requirements for a grade 4 (no internal rot, seams, cracks or branches that exceed 1/3 the diameter of the log at the point of occurence). If it is clear that an upper log has internal rot, then it must be examined further to determine if it can at least meet the requirements for a grade 3. For white pines, simply make sure the upper logs meet the requirements for grade 4. For other pines, simply make sure the upper logs meet the requirements for a grade 3. And for the other softwoods, the upper logs must meet the requirements for grade 1. If any of the upper logs do not meet the minimum grade requirements, then this portion of the tree is rough cull.

Note: Grade requirements for the upper logs are based on log grades and not tree grades. Log grades allow for the scaling diameter (diameter inside bark) to be 8 inches for hardwoods and 6 inches for softwoods. A minimum allowable length is 8 feet. Since log grade rules are no longer instructed in the north, tree grade specifications are applied except for the scaling diameter and minimum lengths.

When Collected: STATE = 23: All TREE CLASS 2 ≥ 11.0 in DBH hardwoods or ≥ 9.0 in DBH softwoods
Field Width: 2 digits
Tolerance: +/- 10%
MQO: At least 90% of the time
Values: 00 to 67

6.5.7N-ME % ROTTEN/MISSING BOARD-FOOT CULL **[BROT]**

Rotten and missing board-foot cull is the volume with the recorded SAWLOG LENGTH that cannot be used to produce boards, because of rot and other unsound defects within sawlogs. ("Missing" is wood absent from a log or part of a log that otherwise would usually be regarded as naturally complete. It may be caused by advanced decay, fire, or the operation of a machine or tool. It also includes sections that contain metal other than aluminum research tags and nails.) Cull is determined by visual evidence on the tree and not by sounding. Record the actual percentage of rotten board-foot cull.

Rotten and missing board-foot cull includes sections that contain rot or missing wood as determined by sector cull. Estimate percent rotten cull volume by using the appropriate board-foot volume cull estimating aid tables for hardwoods or softwoods found in Regional Appendix E.

- Rot or missing wood (including conks and fungal wedges) – any presence.
- Cankers – any degree of severity.
- Metal (except aluminum research nails and tags) – Cull at least a 1 foot cross-section above and below the metal at the point of occurrence.
- Lengths less than 8 feet below a "rot stopper" as described in TREE CLASS.

When Collected: STATE = 23: All TREE CLASS 2 $\geq$ 11.0 in DBH hardwoods or $\geq$ 9.0 in DBH softwoods
Field Width: 2 digits
Tolerance: +/- 10%
MQO: At least 90% of the time
Values: 00 to 67

> NRS Note: % ROUGH BF CULL + % ROTTEN/MISSING BF CULL cannot be greater than 67%. If the actual amount of the combined board-foot cull is greater than 67%, then TREE CLASS is not 2; and board-foot cull is not required.

6.5.8N-ME BOLE LENGTH **[BOLE]**

Record a bole length to the last whole foot of all live and standing dead trees. The measurement begins from a 1 foot stump to a minimum top bole diameter of 4.0 inches DOB for both hardwoods and softwoods.

- For trees that fork only use one stem when determining bole length (i.e., follow the stem yielding the most merchantable volume).
- **Live** tree with **live** broken top with **more than 50% detachment** from the tree but is minimally attached – BOLE LENGTH is taken through or past the break to the minimum 4.0 in. top DOB
- **Live** tree with **dead** broken top with **more than 50% detachment** from the tree – BOLE LENGTH does not extend beyond the break.
- **Dead** tree with **dead** broken top with **more than 50% detachment** from the tree – BOLE LENGTH does not extend beyond the break.
- **Dead** tree with **dead** broken top with **less than or equal to 50% detachment** from the tree – BOLE LENGTH is taken through or past the break to the minimum 4.0 in. top DOB.

When Collected: STATE = 23: All live trees $\geq$ 5.0 in DBH and all standing dead tally trees $\geq$ 5.0 in DBH when TREE CLASS 5
Field Width: 2 digits
Tolerance: +/- 4 feet for trees $\leq$ 40 feet, or +/- 10% of true length for trees > 40 feet
MQO: At least 90% of the time
Values: 04 to 99

6.5.9N-ME % ROUGH CUBIC-FOOT CULL (CORE OPTIONAL) **[CRGH]**

NRS Note: The variable number is correct as it relates to the national field guide.
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 (i.e., REGIONAL BOLE LENGTH) using the appropriate cubic-foot volume cull aid found in Regional Appendix E

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. NRS assesses the amount of actual cull present.

Starting at a 1 foot stump, visually divide the bole length into 4 foot or longer sections. The amount of rough cull to be recorded is the total volume of the bole length that that does not qualify as potential cubic-foot volume. These are sections containing:

- Fork – A fork must be at least 1/3 the diameter of the main stem and branch out from the main stem at 45 degrees or less.
- Excessive sweep and crook – Sweep and crook is usually not a factor in 4 ft lengths
- Sections less than 4 feet in length below a “rough stopper” as described by TREE CLASS.

When Collected: CORE OPTIONAL: All live tally trees ≥ 5.0 in DBH/DRC; STATE = 23: All live trees ≥ 5.0 in DBH and all standing dead tally trees ≥ 5.0 in DBH when TREE CLASS 5
Field width: 2 digits
Tolerance: +/- 10%
MQO: At least 90% of the time
Values: 00 to 99

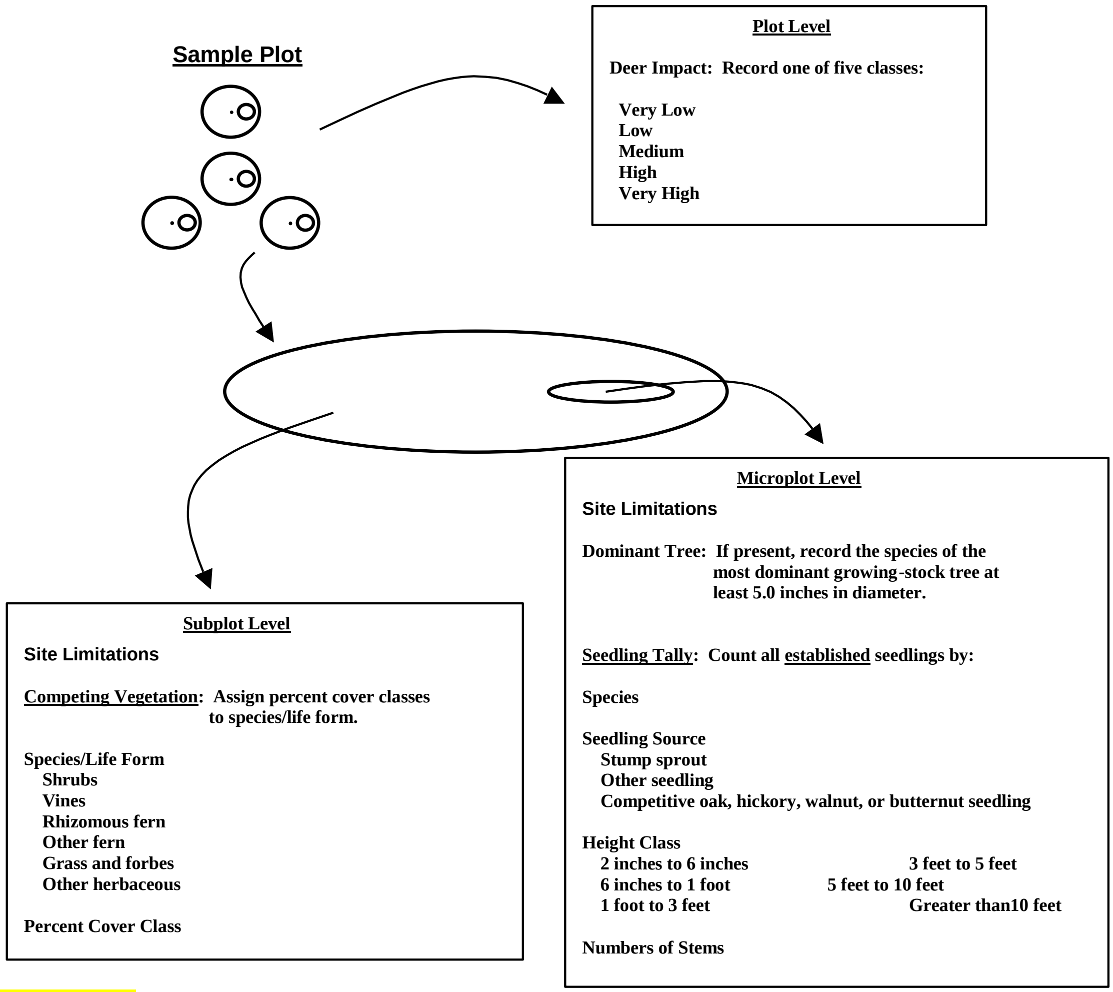
STATE = 42

Pennsylvania's Regeneration Study

Field Instructions for Pennsylvania's Regeneration Study (PRS)

42.0 Overview
The regeneration assessment is being conducted in Pennsylvania at the request of the State's forestry community. There is concern that regeneration is lacking in many stands and with over half of the State's forests in a financially mature condition, this is a critically important issue. The regeneration data will provide answers to questions about advance regeneration, post-disturbance regeneration, and future forest composition. The data will be used to quantify regeneration adequacy statewide, provide estimates of numbers of seedlings per acre, and for research into regeneration dynamics. Regeneration plots are selected prior to the field season and are visited during the leaf-on season from June through September.

The figure on the next page summarizes measurements needed for the regeneration assessment. Data are collected at three levels: the entire sample plot, the subplot, and the microplot. **The associated vegetation and regeneration tallies should be completed for all <u>accessible forest land</u> conditions that are encountered**.



42.1.0 Plot Data

42.1.1 State, Unit, County and Plot Number
Refer to Section 1 of this field guide.

42.1.2 CURRENT MONTH/DAY/YEAR
Refer to Section 1 of this field guide.

42.1.3 DEER IMPACT **[DEER]**
Estimate the amount of browsing pressure that deer are exerting on regeneration. Deer impact is a function of deer population and the amount of available food sources within one-square mile surrounding the plot.

Code	Definition
1	**Very Low** - Plot is inside a well-maintained deer exclosure.
2	**Low** - No browsing observed, vigorous seedlings present (no deer exclosure present).
3	**Medium** - Browsing evidence observed but not common, seedlings common.
4	**High** - Browsing evidence common OR seedlings are rare.
5	**Very High** - Browsing evidence omnipresent OR forest floor bare, severe browse line.

Degree of deer browsing can be a difficult variable to quantify due to preferences that deer have for various food sources and the elusive nature of deer populations. Although not a complete list of species in Pennsylvania, the following deer preference list may be useful for assigning deer impact:

Species	Browse Preference	Tolerance of Browsing
Black Cherry	L	L
Fern	L	H
Grass & Sedge	L-M	H
Striped Maple	L-M	H
American Beech	M	H
Birches	H	M
Oak	H	M-H
Hickory	H	M-H
Ash	H	M
Rubus spp.	H	M-H
Pin Cherry	H	L
Red Maple	H	L
Sugar Maple	H	L
Yellow-poplar	H	L
Cucumbertree	H	L
Eastern Hemlock	H	L

42.2.0 Subplot Data

Complete the subplot data for all forested conditions.

42.2.1 SUBPLOT NUMBER

Record the code corresponding to the subplot number.

42.2.2 CONDITION CLASS NUMBER **[CON#]**

Record the corresponding condition class number.

42.2.3 SUBPLOT SITE LIMITATIONS **[SLIM]**

Record site limitation codes 2 and 3 if they occur on at least 30 percent of the subplot or condition area, else record as code 1.

Code	Definitions
1	No site limitations
2	Rocky surface with little or no soil
3	Water-saturated soil (during the growing season)

42.2.4 COMPETING VEGETATION **[CVEG]**

Assign percent cover classes to species/life forms within the subplot. The sum of the percent cover classes may exceed 100 percent. For subplots with more than one condition, only record percent cover for the portion of the subplot in the condition. For example, if 50 percent of the subplot is in a condition and is entirely covered with Rubus spp., record 99 for percent cover class (100 percent cover).

42.2.5 SPECIES/LIFE FORM **[SPLF]**

Code	Definition
	Deciduous Shrubs (See listing following these instructions.)
	Evergreen Shrubs (See listing following these instructions.)
	Vines (See listing following these instructions.)
0001	**Bracken Fern, Hay-scented Fern, and New York Fern**
0002	Other Fern
0003	Grass
0004	Other Herbaceous

42.2.6 PERCENT COVER CLASS **[PCOV]**
Assign a cover class to each species or life form.

Code	Definition	Code	Definition
01	1 to 9 percent	**50**	50 to 59 percent
10	10 to 19 percent	**60**	60 to 69 percent
20	20 to 29 percent	**70**	70 to 79 percent
30	30 to 39 percent	**80**	80 to 89 percent
40	40 to 49 percent	**90**	90 to 100 perecnt

As an aid in determining percent cover, consider that one-percent cover of the 24-foot radius subplot is equivalent to a square 4.2 feet on each side or a circle with a radius of 2.4 feet. Ten percent cover is equivalent to a square 13.4 feet on each side or a circle with a radius of 7.6 feet.

42.3.0 Microplot Data
Complete the microplot data <u>for microplots within accessible forest land.</u>

42.3.1 MICROPOLOT NUMBER
Record the code corresponding to the microplot number (same as subplot number).

42.3.2 MICROPLOT CENTER CONDITION CLASS **[MCEN]**
Record the corresponding condition class number.

42.3.3 MICROPLOT SITE LIMITATIONS **[MLIM]**
Record the following site limitation if it dominates the area of the microplot or condition:

Code	Definition
1	No site limitation
2	Rocky surface with little or no soil
3	Water-saturated soil (during the growing season)
4	Thick duff layer (in excess of two-inches thick)

42.3.4 DOMINANT TREE **[DOMT]**
Record the presence/absence of at least one growing-stock tree 5.0-inches or larger in diameter at breast height on the microplot or condition by recording species code. If there are no such trees, record as “000.” If more than one such tree is present, record the species code of the tree with the largest diameter.

42.3.5 Tree and Seedling Data
<u>Tally all established seedlings (< 1.0-inch DBH) for stems rooted within the microplot by species, seedling source, and height class.</u>

Count all seedlings at least 2-inches tall with at least two normal-sized leaves that do not still bear cotyledons.

For most species encountered, the tug test should be used to determine if seedlings are established. Seedlings that slip out of the ground with a slight tug do generally not have sufficient root systems to survive through the growing season and are not established.

- Small oak, hickory, walnut, and butternut seedlings (less than 1-foot tall) should be at least 6-inches tall or have a root-collar diameter (RCD) of at least 0.20 inches.

- Pine seedlings should have at least two whorls or be at least 6-inches tall.

42.3.5.1 SPECIES **[SPP]**
Record valid tree species code (see Appendix 3).

42.3.5.2 SEEDLING SOURCE **[SRCE]**
Discriminate between stump sprouts and other seedlings. Tally clumps of stump sprouts as one seedling and tally only the tallest, most dominant sprout for each stump. Tally sprouts on stumps that originate from cutting or mortality only. Stumps must be at least 2 inches in diameter to qualify as having sprouts.

A special code (3) is used for oak, hickory, walnut, and butternut that are classified as "competitive." Research indicates that competitive seedlings are highly likely to become dominant or codominant stems in the next stand. To be classified as competitive, stems must have an RCD > 0.75 inches. In situations with relatively high tally, it should only be necessary to check a few RCD's.

Code	**Definition**
1	Stump sprout
2	Other seedling
3	Competitive oak, hickory, walnut, or butternut seedling

42.3.5.3 HEIGHT CLASS **[HGTC]**
Each seedling is assigned a height class.

Code	**Definition**	**Code**	**Definition**
1	2 inches to 6 inches	**4**	3 feet to 5 feet
2	6 inches to 1 foot	**5**	5 feet to 10 feet
3	1 foot to 3 feet	**6**	Greater than 10 feet

42.3.5.4 NUMBERS OF STEMS **[SED#]**
Record the number of tree seedlings in each category described by species, seedling source, and height class. The first five seedlings of each species must be counted precisely. Counts above five may be estimated. In the case of beech root suckers, count all individuals unless they arise from a single root node, in which case they should be counted as a single stem.

42.2.5 SPECIES/LIFE FORM – SHRUB AND VINE SPECIES CODES FOR ITEM

DECIDUOUS SHRUBS

Code	PLANTS00	Common name	Genus	Species
9350	ALNUS	**Alder spp.**	**Alnus**	**spp.**
9352	ALINR	speckled alder	A.	incana ssp. rugosa (rugosa)
9353	ARSP2	Hercules club	Aralia	spinosa
9365	**PHOTI**	**chokeberry spp.**	**Photinia (Aronia)**	**spp.**
9366	**RHODO**	**azalea spp.**	**Rhododendron (Azalea)**	**spp.**
9368	**BERBE**	**barberry spp.**	**Berberis**	**spp.**
9381	CEOC2	buttonbush	Cephalanthus	occidentalis
9458	CEAM	New Jersey tea	Ceanothus	americanus
9465	CLAL3	sweet pepperbush	Clethra	alnifolia
9475	CHVI3	fringetree	Chionanthus	virginicus
9485	COPE80	sweetfern	Comptonia	peregrina
9492	COAL2	alternate-leaved dogwood	Cornus	alternifolia
9493	COAM2	silky dogwood	C.	amomum (obliqua)
9494	CORU	round-leaved dogwood	C.	rugosa (circinata)
9496	CORA6	gray-stemmed/panicled dogwood	C.	racemosa (paniculata)
9497	COSES	red-osier dogwood	C.	sericea ssp. sericea (stolonifera)
9501	COAM3	American hazelnut	Corylus	americana
9502	COCO6	beaked hazelnut	C.	cornuta (rostrata)
9525	DIPA9	leatherwood	Dirca	palustris
9535	ELAEA	autumn olive	Elaeagnus	umbellata
9549	**GAYLU**	**huckleberry spp.**	**Gaylussacia**	**spp.**
9585	HAVI4	witch-hazel	Hamamelis	virginiana
9592	ILMO	large-leaf holly	Ilex	montana (monticola)
9593	ILVE	winterberry holly	Ilex	verticillata
9604	**LEUCO5**	**fetter-bush spp.**	**Leucothoe**	**spp.**
9609	LIBE3	common spicebush	Lindera	benzoin
9635	**LONIC**	**bush honeysuckle spp.**	**Lonicera**	**spp.**
9637	**LYONI**	**male-berry, staggerbush spp.**	**Lyonia**	**spp.**
9643	MYGA	sweet gale	Myrica	gale
9644	MOPE6	bayberry	Morella (Myrica)	pensylvanica
9685	NEMU2	mountain-holly	Nemopanthus	mucronatus
9725	PHOP	ninebark	Physocarpus	opulifolius
9845	**RHAMN**	**buckthorn spp.**	**Rhamnus**	**spp.**
9856	**RHODO**	**azalea (deciduous) spp.**	**Rhododendron (Azalea)**	**spp.**
9864	RHCO	winged sumac	Rhus	copallinum
9865	RHGL	smooth sumac	R.	glabra
9866	RHHI2	staghorn sumac	R.	hirta (typhina)
9868	TOVE	poison sumac	Toxicodendron (Rhus)	vernix
9870	**RIBES**	**currant, gooseberry spp.**	**Ribes**	**spp.**
9905	**ROSA5**	**Rose spp.**	**Rosa**	**spp.**
9915	**RUBUS**	**briar, bramble, dewberry spp.**	**Rubus**	**spp.**
9925	SANIC4	American elderberry	Sambucus	nigra ssp. canadensis (canadensis)

Code	PLANTS00	Common name	Genus	Species
9926	SARA2	red-berried elderberry	S.	racemosa
9929	**SALIX**	**shrub willows spp. (all other willows not indicated in tree codes**	**Salix**	**spp.**
9937	**SPIRA**	**spirea spp.**	**Spiraea**	**spp.**
9982	STTR	American bladdernut	Staphylea	trifolia
9983	**VACCI**	**Blueberry spp.**	**Vaccinium**	**spp.**
9985	**VIBUR**	**Viburnum spp.**	**Viburnum**	**spp.**
9986	VIAC	maple-leaved viburnum	V.	acerifolium
9987	VILA11	hobblebush viburnum	V.	lantanoides (alnifolium)
9988	VINUC	wild raisin, withe-rod	V.	nudum var. cassinoides (cassinoides)
9989	VIDE	arrowwood	V.	dentatum
9990	VILE	nannyberry	V.	lentago
9991	VIPR	blackhaw	V.	prunifolium
9992	VIOPA2	highbush cranberry	V.	opulus var. americanum (trilobum)
9994	ZAAM	common prickly-ash	Zanthoxylum	americanum
9997	**2SD**	**unknown or not listed**		

If species is not listed, use generic genus code.

EVERGREEN SHRUBS

Code	PLANTS00	Common Name	Genus	Species
9045	CHCA2	leatherleaf	Chamaedaphne	calyculata
9061	JUCO6	common juniper	Juniperus	communis
9232	TACA7	Canada yew	Taxus	canadensis
9357	ANPOG	bog rosemary	Andromeda	polifolia var. glaucophylla (glaucophylla)
9605	KAAN	sheep laurel	Kalmia	angustifolia
9606	KALA	mountain laurel	K.	latifolia
9607	KAPO	swamp laurel	K.	polifolia
9608	LEGR	Labrador tea	Ledum	groenlandicum
9642	MOCE2	wax myrtle	Morella (Myrica)	cerifera
9855	**RHODO**	**rhododendron spp.**	**Rhododendron**	**spp.**
9945	SYTI	sweetleaf	Symplocos	tinctoria
9998	**2SE**	**unknown or not listed**		

If species is not listed, use generic genus code.

DWARF SHRUBS

Code	PLANTS00	Common Name	Genus	Species
9363	ARUV	bearberry	Arctostaphylos	uva-ursi
9364	ARAL2	alpine bearberry	Arctostaphylos	alpinus
9441	CHMA3	striped pipsissewa	Chimaphila	maculata
9442	CHUM	pipsissewa	Chimaphila	unbellata ssp. cisatlantica
9498	COCA13	bunchberry	Cornus	canadensis

9547	GAHI2	creeping snowberry	Gaultheria (Chiogenes)	hispidula
9548	GAPR2	teaberry	Gaultheria	procumbens
9603	DILA	diapensia	Diapensia	lapponica
9615	LIBO3	twinflower	Linnaea	borealis ssp. americana
9618	LOPR	alpine azalea	Loiseleuria	procumbens
9675	MIRE	partridgeberry	Mitchella	repens
9677	SITR3	three-toothed cinquefoil	Sibbaldiopsis (Potentilla)	tridentata
9981	**VACCI**	**cranberry spp.**	**Vaccinium**	**spp.**
9996	**2SUBS**	**unknown or not listed**		

If species is not listed, use generic genus code.

VINES

Code	**PLANTS00**	**Common Name**	**Genus**	**Species**
9451	AMBR2	hog peanut	Amphicarpaea	bracteata
9454	APAM	ground-nut	Apios	americana
9455	CESC	American bittersweet	Celastrus	scandens
9477	**CLEMA**	**clematis sp.**	**Clematis**	**spp.**
9636	**LONIC**	**vine honeysuckle**	**Lonicera**	**spp.**
9715	PAQU2	Virginia creeper	Parthenocissus	quinquefolia
9867	TORAR	poison ivy	Toxicodendron (Rhus)	radicans ssp. radicans (radicans)
9934	**SMILA2**	**Greenbrier spp.**	**Smilax**	**spp.**
9993	**VITIS**	**Grape spp.**	**Vitis**	**spp.**
9995	**2V**	**unknown or not listed**		

If species is not listed, use generic genus code.

STATE	UNIT	COUNTY	PLOT #	MONTH	DAY	YEAR	DEER IMPACT
XX	X	XXX	XXXX	XX	XX	XXXX	X

USDA FOREST SERVICE
NORTHEASTERN RESEARCH STATION
FOREST INVENTORY AND ANALYSIS
PENNSYLVANIA REGENERATION ASSESSMENT

SUBPLOT #	CONDITION CLASS #	SITE LIMITATIONS	SPECIES/LIFE FORM	PERECNT COVER CLASS
X	X	X	XXX	XX

MICROPLOT #	MICRO CENTER COND CLASS #	SITE LIMITATIONS	DOMINANT TREE	SPECIES	SEEDLING SOURCE	HEIGHT CLASS	NUMBERS OF STEMS
X	X	X	XXX	XXX	X	X	XXXX

		Other Seedlings (2)						Stump Sprouts (1)						Competitive oak, hickory, walnut, butternut (3)					
Height Class		1	2	3	4	5	6	1	2	3	4	5	6	1	2	3	4	5	6
POINT #	SPECIES	2 - 6 in	6 in - 1 ft	1 - 3 ft	3 - 5 ft	5 - 10 ft	> 10 ft	2 - 6 in	6 in - 1 ft	1 - 3 ft	3 - 5 ft	5 - 10 ft	> 10 ft	2 - 6 in	6 in - 1 ft	1 - 3 ft	3 - 5 ft	5 - 10 ft	> 10 ft

Regional Appendix E. Tables and Charts

This appendix includes tree grading tables, hardwood tree grade defects, cull estimation tables, and other aids for data collection.

HARDWOOD TREE GRADES			
GRADING FACTORS	**GRADE 1**	**GRADE 2**	**GRADE 3**
Length of grading zone (ft)	Butt 16	Butt 16	Butt 16
Length of grading section[a] (ft)	Best 12	Best 12	Best 12
Minimum DBH (in)	16[b]	13	11
Minimum DIB at the top of the grading section (in)	13[b] 16 20	11[c] 12	8
Clear cuttings on 3rd best face[d]			
minimum length (ft)	7 5 3	3 3	2
number on face (max)	2	2 3	unlimited
yield in face length (min)*	5/6	4/6	3/6
Cull deduction, including crook and sweep but excluding shake, maximum w/in grading section (%)	9	9[e]	50

[a] Whenever a 14- or 16-ft section of the butt log is better than the best 12-ft section, the grade of the longer section will become the grade of the tree. This longer section, when used, is the basis for determing the grading factors, such as diameter and cull deduction.

[b] In basswood and ash, DIB at the top of the grading section may be 12-in and DBH may be 15-in.

[c] Grade 2 trees can be 10-in DIB at the top of the grading section if otherwise meeting suface requirements for small grade 1's.

[d] A clear cutting is a portion of a face free of defects, extending the width of the face. A face is one-fourth of the surface of the grading section as divided lengthwise.

[e] 15% crook and sweep, or 40% total cull deduction are permitted in grade 2 if size and surface of grading section qualify as grade 1. If rot shortens the required clear cuttings to the extent of dropping the butt log to grade 2, do not drop the tree's grade to 3 unless the cull deduction for rot is greater than 40%.

*Minimum Yield in Face Length			
Face Length	Grade 1 Min. Yield	Grade 2 Min. Yield	Grade 3 Min. Yield
12-ft	10-ft	8-ft	6-ft
14-ft	11.7-ft	9.3-ft	7-ft
16-ft	13.3-ft	10.7-ft	8-ft

Source: U.S.D.A. Forest Service Research Paper NE-333, 1976.

<u>Hardwoods</u> – Use the specifications for Hardwood Tree Grades (1, 2 or 3) or the Tie and Timber Grade (4) for all hardwood trees. **Growing Stock trees that do not have a merchantable grade in the butt 16 but do have a 12 foot or two 8 foot gradable sections somewhere in the tree will be assigned grade 5.** Note: When determining the grade of upper logs, 8-foot saw logs need to meet all the minimum grading factors except for length for hardwood tree grades 3 or 4.

LOG SURFACE ABNORMALITIES THAT ARE HARDWOOD TREE GRADING DEFECTS

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

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

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

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

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

Bird peck – There must be four bird pecks within a square foot to affect the tree grade and be considered a defect. First, determine the tree grade without the bird pecks. If the tree grade is determined to be 1 or 2, then down grade the tree by one grade. If the tree graded out to be a 3 or 4 without the bird pecks, then ignore them as defects and record the initial tree grade.

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

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

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

Holes – All holes are grading defects.

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

Metal – Logs suspected of or know to contain metal should either be long butted or rejected. All metal (except aluminum research tags and nails) is considered an unsound grading defect.

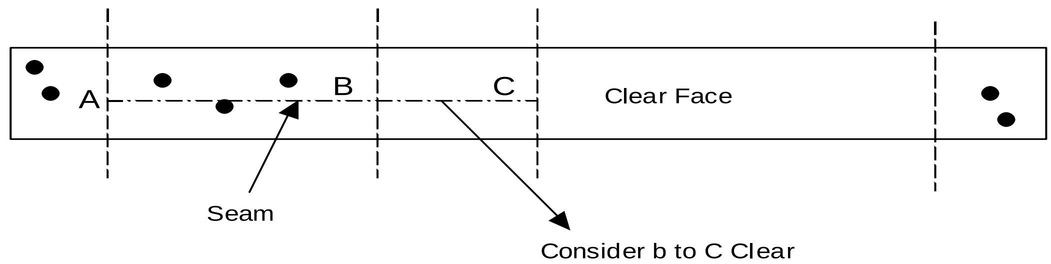
Rot – Wood which has decayed to the point where it is useless. Coded only if visible.

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

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

- A deep seam entering a face but not running full length may be overlaid with a clear cutting for one-third of its length, starting at the inner end. Note: This is difficult to determine on a standing tree. See Figure RA_E1.

- When a deep seam is entirely within a log, clear cuttings can be laid over from each end for a distance equal to one-fourth its full length. Note: This is difficult to determine on a standing tree. See Figure RA_E2.



A to B = 2/3 (of the seam)
B to C = 1/3 (of the seam)
A to C = total length of the seam

Figure RA_E1. The 1/3 rule

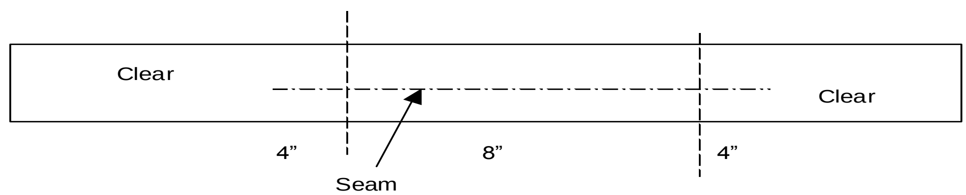


Figure RA_E2. The ¼ Rule

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

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

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

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

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

HARDWOOD CONSTRUCTION GRADE 4	
GRADING FACTORS	**SPECIFICATIONS**
Position in tree	Butts and uppers
Scaling diameter (in)	8-in DIB and larger
Length, w/o trim (ft)	12-ft and longer
Clear cuttings	No requirements (not graded on cutting basis)
Maximum sweep allowance	One-fourth DIB of small end for half logs, and one-half DIB for logs 16-ft long
Sound surface defects - Single knots	Any number, if none has an average collar[a] diameter that is more than one-third of the log diameter at the point of occurrence.
Whorled knots	Any number, provided the sum of the collar diameters does not exceed one-third the log diameter at the point of occurrence.
Holes	Any number not exceeding knot specifica-tions, if they do not extend more than 3-in into the contained tie or timber.
Unsound surface defects[b]	Any number and size, if they do not extend into contained tie or timber. If they extend into contained tie or timber, they shall not exceed size, number, and depth of limits for sound defects.

[a] Knot collar is the average of the vertical and horizontal diameters of the limb, or knot swelling, as measured at the point where they would be trimmed from the main stem.

[b] ~~Interior defects are not visible in standing trees. They are considered in grading cut logs. No interior defects are permitted except one shake not more than one-third the width of the contained tie or timber, and one split not more than 5-in long.~~

Note: The hi-lighted text indicates NRS modification from the original hardwood construction log grade (U.S.D.A. Forest Service General Technical Report NE-1, 1973).

Hardwoods – Use the specifications for Hardwood Tree Grades (1, 2 or 3) or the Tie and Timber Grade (4) for all hardwood trees. **Growing Stock trees that meet the definition of growing stock without a merchantable grade in the butt 16 but with a 12 foot or two 8 foot gradable sections somewhere in the tree will be assigned grade 5.** Note: When determining the grade of upper logs, 8-foot or longer saw logs need to meet all the minimum grading factors except for length for hardwood tree grades 3 or 4.

The presence of a crack or seam is considered an indication of unsoundness within the grading section and is not allowed in grade 4. Callus tissue from open wounds is not considered cracks or seams.

For grade 4, there will be no minimum size requirement for individual knots. Whorled knots will be the sum of all overlapping knots present at any given cross section. If the sum of all knots, in a cross section, exceeds 1/3 the diameter of the log at that point, it will not meet requirements for Hardwood construction grade 4. The diameter of each knot is measured above the callus.

EASTERN WHITE PINE TREE GRADES				
GRADING FACTORS	**GRADE 1**	**GRADE 2**	**GRADE 3**	**GRADE 4**
Minimum DBH (in)	9	9	9	9
Length of grading zone (ft)	Butt 16	Butt 16	Butt 16	Butt 16
Length of grading section (ft)	Best 12	Best 12	Best 12	Best 12
Maximum weevil injury in butt 16 ft (number)	None	None	2 Injuries	No limit
Minimum face requirements on grading section	Two full length or four 8-ft 50% length good faces[1]. (In addition, knots on balance of faces shall not exceed size limitations for Grade 2 sections.)	NO GOOD FACES REQUIRED. Maximum diam-eter of knots on 3 best faces: **SOUND RED KNOTS** not to exceed 1/6 of scaling diameter or 3-in maximum[2]. **DEAD OR BLACK KNOTS**, in-cluding over-grown knots, not to exceed 1/12 scaling diameter and 1-1/2-in maximum.	NO GOOD FACES REQUIRED. Maximum diam-eter of knots on 3 best faces: **SOUND RED KNOTS** not to exceed 1/3 of scaling diameter of 5-in maximum[2]. **DEAD OR BLACK KNOTS**, in-cluding over-grown knots, not to exceed 1/6 scaling dia-meter and 2-1/2-in maximum.	Includes all trees not qualifying for Grade 3 or better and judged to have at least 1/3 of their gross volume in sound wood suitable for manufacture into standard lumber.
Maximum sweep or crook in *grading section* (%)	20	30	40	No limit
Maximum total scaling deduction in *grading section* (%)	50	50	50	No limit

After the tentative grade of the section is established from face examination, the section will be ***reduced one grade*** whenever the following defects are evident[3]:

CONKS, PUNK KNOTS AND PINE BORER DAMAGE ON THE SURFACE OF THE SECTION

Degrade one grade if present on one face.
Degrade two grades if present on two faces.
Degrade three grades if present on three to four faces.

If the final grade of the grading section is 1, 2 or 3, examine the tree for weevil injuries in the merchantable stem ***above*** 16-ft. If the total apparent weevil damage exceeds 3, degrade the tree grade one below the section grade[3]. Otherwise the tree grade is the same as the final section grade.

[1] Trees under 16-in DBH require four 8-ft full length good faces.
[2] Scaling diameter is estimated at the top of the grading section.
[3] No tree will be designated below Grade 4 unless net tree scale is less than one-third of gross tree scale.

Note: The hi-lighted text indicates NRS modification from the original EWP Tree Grade Table (U.S.D.A. Forest Service Research Paper NE-214, 1971).

Eastern white pine – Use the Eastern White Pine Tree Grades (1, 2, 3 or 4) for eastern white pine only. **Growing Stock trees that do not have a merchantable grade in the butt 16 but do have a 12 foot or two 8 foot gradable sections somewhere in the tree will be assigned**

grade 5. Note: When determining the grade of upper logs, 8-foot saw logs need to meet all the minimum grading factors except for length for white pine tree grade 4.

WHITE PINE COLLAR DIAMETER LIMITS FOR WHITE PINE TREE GRADING

WHITE PINE COLLAR DIAMETER LIMITS FOR RED AND BLACK KNOTS				
SCALING DIAMETER (D.I.B. inches)	**GRADE 1 AND 2**		**GRADE 3**	
	BLACK KNOTS 1/12th	**RED KNOTS 1/6th**	**BLACK KNOTS 1/6th**	**RED KNOTS 1/3rd**
7	7/12"	1 - 1/6"	1 - 1/6"	2 - 1/3"
8	2/3"	1 - 1/3"	1 - 1/3"	2 - 2/3"
9	3/4"	1 - 1/2"	1 - 1/2"	3"
10	5/6"	1 - 2/3"	1 - 2/3"	3 - 1/3"
11	11/12"	1 - 5/6"	1 - 5/6"	3 - 2/3"
12	1"	2"	2"	4"
13	1 - 1/12"	2 - 1/6"	2 - 1/6"	4 - 1/3"
14	1 - 1/6"	2 - 1/3"	2 - 1/3"	4 - 2/3"
15	1 - 1/4"	2 - 1/2"	**2 - 1/2" MAX**	**5" MAX**
16	1 - 1/3"	2 - 2/3"		
17	1 - 5/12"	2 - 5/6"		
18	**1 - 1/2" MAX**	**3 MAX"**		

Red knots – Visible branches, stubs or sockets that are from living branches or branches that have recently died. They are inter-grown with the surrounding wood and contain no rot.

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

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

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

PINE TREE GRADES (All pines except White Pine.)			
FACE LENGTH	GRADE 1	GRADE 2	GRADE 3
Best 12 or longer within the butt 16 ft grading section	3 or 4 clear faces	1 or 2 clear faces	No clear faces

After the tentative grade is established, the tree will be ***reduced one grade*** for each of the following:

Sweep - Degrade any tentative Grade 1 or 2 tree one grade if sweep in the lower 12-ft of the grading section amounts to 3 or more inches and equals or exceeds one-fourth the DBH.

Heart rot - Degrade any tentative Grade 1 or 2 tree one grade if conks, punk knots, or other evidence of advanced heart rot is found anywhere on the tree stem.

Note - No tree can be degraded below Grade 3, provided the total scaling deductions for sweep and/or rot do not exceed two-thirds the gross scale of the tree. Trees with total scaling deductions in excess of two-thirds are classified as cull.

A face is one-fourth the circumference of the grading section and extends the full length of the grading section. Clear faces are those free from knots measuring more than 1/2-in in diameter, overgrown knots of any size, and holes more than 1/4-in in diameter. Faces may be rotated, if necessary, to obtain the maximum number of clear faces on the grading section.

Note: The hi-lighted text indicates NRS modification from the original Southern Pine Tree Grades (U.S.D.A. Forest Service Research Paper SE-40, 1968).

Other pines – Use the Pine Tree Grades (1, 2 or 3) for all pines except eastern white pine. There is no grade 4 for the Pine Tree Grades. **Growing Stock trees that do not have a merchantable grade in the butt 16 but do have a 12 foot or two 8 foot gradable sections somewhere in the tree will be assigned grade 5.** Note: When determining the grade of upper logs, 8-foot saw logs need to meet all the minimum grading factors except for length for pine tree grade 3.

OTHER SOFTWOODS Minimum Merchantability Specifications for Grade 1					
Grade the best 12 ft within the 1st 16 ft.[1]					
Grade	**DIB at the top of the grading section**	**Length (2-ft multiples w/o trim)**	**Total Deduction**	**Sweep Permitted**	**Other Requirements***
1	6" - 12"	12' - 16'	50%	25%	Sound knots not over 2" in diameter are permitted.
	13" +	12' - 16'	50%	25%	Sound knots not over 3" in diameter are permitted.

[1] When ever a 14-ft or 16-ft section of the butt log is better than the best 12-ft section, the grade of the longer section will become the grade of the tree. This longer section, when used, is the basis for determining the grading factors, such as DIB and sweep.

* One branch or sound knot that exceeds the diameter limitations is permitted to meet Grade 1 specifications. This is a Northern allowance. Sound knots are measured at the point where the limb would normally be trimmed from the main stem.

Note: The hi-lighted text indicates NRS modification from the original specifications from the Northeast Field Guide, Version 3.0. The above specifications are based on a log grade. Tree grades have never been developed for these other softwood species that include spruce, fir, hemlock, larch (tamarack), cypress and cedar.

Other softwoods– Use the Other Softwoods Tree Grade (1) for spruce, fir, hemlock, larch (tamarack), cedar and cypress. **Growing Stock trees that do not have a merchantable grade in the butt 16 but do have a 12 foot or two 8 foot gradable sections somewhere in the tree will be assigned grade 5.** Note: When determining the grade of upper logs, 8-foot saw logs need to meet all the minimum grading factors except for length for other softwood grade 1.

The following table is applied to determine the percent of **hardwood board-foot cull within the sawlog length** (or potential sawlog for a poletimber-size tree) that starts from a 1 foot stump to 9-in top DOB. These tables can be used to determine "sector" cull of a 4-ft section. Any 4-ft section can be reduced by quarters, thirds or one-half. E.g., a 32 ft hardwood sawlog has a fork within the 6th section. The fork accounts for one-half of the volume for that section, and therefore represents 6% board-foot cull.

PERCENT OF BOARD-FOOT CULL OF HARDWOOD SAWTIMBER
[BY 4-FT SECTIONS & LOCATION IN THE TREE]

LOG (FT)	1ST	2ND	3RD	4TH	5TH	6TH	7TH	8TH	9TH	10TH	11TH	12TH	13TH	14TH	15TH	16TH
1 (16)	29	26	24	21												
1-1/2 (24)	19	18	16	16	16	15										
2 (32)	15	14	13	13	12	12	11	10								
2-1/2 (40)	12	12	11	11	10	10	9	9	8	8						
3 (48)	12	10	10	9	9	9	8	7	7	7	6	5				
3-1/2 (56)	10	10	9	9	9	8	8	7	7	6	5	5	4	3		
4 (64)	9	9	9	8	8	7	7	7	6	6	5	5	4	4	3	3

The following table is applied to determine the percent of **softwood board-foot cull within the sawlog length** (or potential sawlog for a poletimber-size tree) that starts from a 1 foot stump to 7-in top DOB. These tables can be used to determine "sector" cull of a 4-ft section. Any 4-ft section can be reduced by quarters, thirds or one-half. E.g., a 32 ft softwood sawlog has a fork within the 6th section. The fork accounts for one-half of the volume for that section, and therefore represents 5% board-foot cull.

PERCENT OF BOARD-FOOT CULL OF SOFTWOOD SAWTIMBER
[BY 4-FT SECTIONS & LOCATION IN THE TREE]

LOG (FT)	1ST	2ND	3RD	4TH	5TH	6TH	7TH	8TH	9TH	10TH	11TH	12TH	13TH	14TH	15TH	16TH
1 (16)	33	27	21	19												
1-1/2 (24)	26	20	16	15	12	11										
2 (32)	21	17	14	12	10	9	9	8								
2-1/2 (40)	19	15	12	10	9	8	7	7	7	6						
3 (48)	16	13	11	10	8	7	7	6	6	6	5	5				
3-1/2 (56)	13	12	10	9	7	7	6	6	6	5	5	5	5	4		
4 (64)	10	9	9	8	7	7	6	6	6	5	5	5	5	4	4	4

The following table is applied to determine the percent of **cubic-foot cull within the bole length** that starts at a 1 foot stump to a 4-in top DOB for all species. These tables can be used to determine “sector” cull of a 4-ft section. Any 4-ft section can be reduced by quarters, thirds, or one-half. E.g., a 32 ft bole length has a fork within the 6th section. The fork accounts for one-half of the volume for that section, and therefore represents 4% cubic-foot cull.

PERCENT OF CUBIC-FOOT CULL VOLUME FOR ALL TREES
[BY 4-FT SECTIONS & LOCATION IN THE TREE]

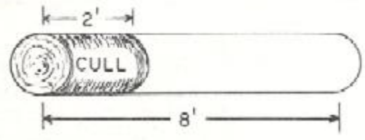
FEET		1ST	2ND	3RD	4TH	5TH	6TH	7TH	8TH	9TH	10TH	11TH	12TH	13TH	14TH	15TH	16TH	17TH	18TH
LENGTH	**8**	57	43																
	12	42	32	26															
	16	30	26	23	21														
	20	26	23	21	19	11													
	24	24	21	18	17	10	10												
	28	21	19	17	16	10	9	8											
	32	20	18	16	14	10	8	7	7										
	36	19	16	14	13	9	8	8	7	6									
	40	17	15	13	12	9	8	7	7	6	6								
	44	16	14	12	11	9	7	7	7	6	6	5							
	48	15	13	12	10	8	7	7	6	6	6	5	5						
	52	14	12	11	9	8	7	6	6	6	6	5	5	5					
	56	13	11	10	9	8	6	6	6	6	6	5	5	5	4				
	60	12	11	10	9	7	6	6	6	6	5	5	5	5	4	4			
	64	11	10	9	9	7	6	6	6	5	5	5	5	5	4	4	4		
	68	10	10	9	8	6	6	6	5	5	5	5	5	4	4	4	4	4	
	72	10	9	8	8	6	6	6	5	5	5	4	4	4	4	4	4	4	4

METHODS OF DETERMINING
SCALING DEDUCTION

(Examples based on an 8-foot log with 20-inch scaling diameter)

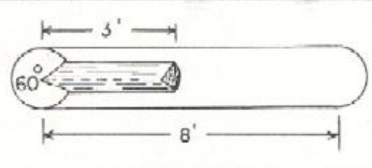
If <u>section</u> of bole is affected, deduct percent of log length affected.

Example: $\frac{2}{8}$ = 25 percent cull



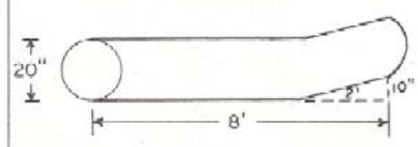
If <u>sector</u> is affected, multiply percent of circle times percent of length.

Example: $\frac{60^{\circ}}{360^{\circ}} \times \frac{3}{8}$ = 6% cull



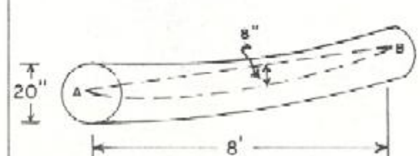
For a <u>crook</u>, multiply proportion of diameter displaced times proportion of log length affected by crook.*

Example: $\frac{10}{20} \times \frac{2}{8}$ = 12% b.f. cull

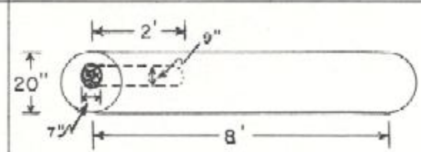


For a <u>sweep</u>, determine sweep departure and subtract 1" for 8' logs or 2" for 16' logs. Divide by log diameter.

Example: $\frac{8-1}{20}$ = 35% b.f. cull**



For <u>interior cull</u>, square out interior cull as a percent of total volume of the section. For bd. ft. cull, add 1" to width and to thickness; for cu. ft. cull, use actual dimensions of rot. For bd. ft. cull divide width and thickness by the scaling diameter (ave. d.i.b., small end) minus 1; for cu. ft. cull, divide by scaling diameter. Multiply fractions by percent of log affected.



Example: $\frac{8 \times 10}{(20-1)^2} \times \frac{2}{8}$ = 6% cubic-foot cull

* No reduction of cubic-foot volume will be made.

** If a straight line between A and B falls outside the bark, the affected section is over 50% cull in board feet.

In the table below, excessive sweep is indicated by the “boxed” values or where values are blank. The values in this table are actual board-feet and not a percentage.

SWEEP DEDUCTION IN BOARD FEET

Sweep departure (inches)	Sweep length (feet)	Scaling diameter of section with sweep (inches)													
		6	**7**	**8**	**9**	**10**	**12**	**14**	**16**	**18**	**20**	**22**	**24**	**26**	**28**
2	6	1	1	2	2	3	3	4	5	6	6	7	8	9	9
	8	1	1	2	2	3	4	5	5	6	7	8	8	9	10
	10	1	1	2	2	3	4	4	5	6	7	7	8	9	10
	12	1	1	2	2	2	3	4	4	5	5	6	6	7	8
	14	1	1	1	1	1	2	2	2	3	3	3	4	4	5
	16	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3	6	2	3	3	4	5	6	7	9	10	11	13	14	15	17
	8	2	3	4	5	6	7	9	10	12	14	15	17	19	20
	10	2	4	5	6	6	8	10	12	13	15	17	19	20	22
	12	3	4	5	6	7	9	11	12	14	16	18	19	21	23
	14	3	4	5	6	7	9	10	12	14	16	17	19	21	23
	16	3	4	5	6	6	8	10	11	13	14	16	18	19	21
4	6	3	4	5	6	7	8	11	13	15	17	18	20	22	24
	8	4	5	6	7	9	11	14	16	18	21	23	25	28	30
	10	5	6	8	9	10	13	16	19	21	24	27	29	32	35
	12	5	7	8	10	12	14	18	20	23	26	29	32	35	38
	14	6	8	9	11	12	16	19	22	25	28	31	35	38	41
	16	6	8	10	11	13	16	19	23	26	29	32	35	39	42
5	6		5	6	8	9	11	14	16	19	22	24	27	29	32
	8	5	7	8	10	12	15	18	21	24	27	31	34	37	40
	10	6	8	10	12	15	18	21	25	29	33	36	40	44	48
	12	8	10	12	12	16	20	25	29	33	37	41	45	50	54
	14	9	11	13	16	18	22	27	32	36	41	45	50	54	59
	16	10	12	15	17	20	24	29	34	39	44	48	53	58	63
6	6			8	9	11	14	17	20	24	27	30	33	36	39
	8			11	12	14	18	22	26	30	34	38	42	46	50
	10		10	13	15	18	23	27	32	36	41	46	51	56	60
	12		12	15	18	21	26	32	37	42	48	53	58	64	69
	14	11	15	18	20	23	29	36	41	47	53	59	65	71	77
	16	13	16	20	23	26	32	39	45	52	58	64	71	77	83
7	6				11	13	16	21	24	28	32	36	39	43	47
	8				15	17	22	27	31	36	41	46	51	56	60
	10				19	21	27	33	39	44	50	56	62	67	73
	12				22	25	32	39	45	52	58	65	71	78	84
	14				25	29	36	44	51	58	66	73	81	88	95
	16			24	28	33	40	49	57	64	72	80	88	96	104
8	6						19	24	28	33	37	41	46	50	54
	8						25	31	37	42	48	54	59	65	70
	10					25	32	39	46	52	59	66	72	79	86
	12					30	37	46	53	61	69	76	84	92	100
	14					34	43	52	61	69	78	87	96	105	113
	16				34	39	48	58	68	77	87	97	106	116	125
9	6							27	32	37	42	47	52	57	62
	8						29	36	42	48	55	61	68	74	80
	10						37	44	52	60	67	75	83	91	99
	12						43	52	61	70	80	88	97	106	115
	14						50	61	71	81	91	101	111	121	131
	16						57	68	79	90	102	113	124	135	146

In the table below, excessive crook is indicated by the “boxed” values or where values are blank. The values in this table are actual board-feet and not a percentage.

CROOK DEDUCTION IN BOARD FEET

Crook departure (inches)	Crook length (feet)	Scaling diameter of section with crook (inches)													
		6	**7**	**8**	**9**	**10**	**12**	**14**	**16**	**18**	**20**	**22**	**24**	**26**	**28**
1	1	0	0	0	0	0	0	1	1	1	1	1	1	1	1
	2	0	0	0	1	1	1	1	1	1	2	2	2	2	2
	3	1	1	1	1	1	1	2	2	2	2	3	3	3	4
	4	1	1	1	1	1	2	2	3	3	3	4	4	4	5
	5	1	1	1	1	2	2	3	3	4	4	5	5	6	6
	6	1	1	2	2	2	3	3	4	5	5	6	6	7	8
2	1	0	0	0	1	1	1	1	1	1	2	2	2	2	3
	2	1	1	1	1	1	2	2	2	3	3	4	4	4	5
	3	1	1	2	2	2	3	3	4	4	5	6	6	7	7
	4	1	1	2	2	3	3	4	5	6	7	8	8	9	10
	5	1	2	2	3	3	4	5	6	8	8	10	10	11	13
	6	2	2	3	4	4	5	7	8	9	10	12	13	14	15
3	1	0	0	1	1	1	1	2	2	2	3	3	3	3	4
	2	1	1	2	2	2	2	3	4	4	5	6	6	7	7
	3	1	2	2	3	3	4	5	6	7	8	9	9	10	11
	4	2	2	3	3	4	5	6	8	9	10	11	12	13	15
	5	2	3	4	4	5	6	8	10	11	13	14	16	17	19
	6	2	3	4	5	6	8	10	12	14	15	17	19	20	23
4	1	1	1	1	1	1	2	2	2	3	3	4	4	4	5
	2	1	2	2	2	3	3	4	5	6	7	8	8	9	10
	3	1	2	3	4	4	5	7	8	9	10	11	12	13	15
	4	2	3	4	4	5	7	9	10	12	13	15	17	18	20
	5	3	3	5	6	7	9	11	13	15	17	19	21	22	25
	6	3	5	6	7	8	11	13	15	18	20	23	25	27	30
5	1			1	2	2	2	3	3	4	4	5	5	6	6
	2			2	3	4	4	5	6	7	8	9	10	11	12
	3			4	4	5	7	8	10	11	12	14	16	17	19
	4			5	6	6	9	11	13	15	17	19	21	22	25
	5			6	7	8	11	13	16	19	21	24	26	28	31
	6			8	9	10	13	16	19	23	26	29	32	34	38
6	1				2	2	2	3	4	4	5	6	6	7	8
	2				3	4	5	6	7	9	10	11	13	13	15
	3				5	6	8	10	12	13	15	17	19	20	22
	4				7	8	10	13	15	18	20	23	25	27	30
	5				9	10	13	16	19	23	25	29	32	34	38
	6				11	13	16	20	23	27	31	34	38	41	45
8	1						3	5	5	6	7	8	8	9	10
	2						7	9	10	12	13	15	17	18	20
	3						10	13	16	18	20	23	25	27	30
	4						14	17	20	24	27	30	33	36	40
	5						17	22	26	30	34	38	42	45	50
	6						21	26	31	36	41	46	51	54	60
10	1								6	7	8	10	10	11	12
	2								12	14	16	19	21	23	25
	3								19	22	25	28	31	34	37
	4								26	29	34	37	41	45	49
	5								32	37	42	47	52	57	62
	6								39	45	51	57	63	69	75

GROSENBAUGH'S RULE 3 & 4 FOR SWEEP AND CROOK DEDUCTION

In determining sweep the number subtracted from actual sweep depends on the log length as follow: 8 thru 10 ft is -1 in, 11 thru 13 ft is -1 ½ in, and 14 thru 16 ft is -2 in.

Rule 3 from Grosenbaugh	**Rule 4 from Grosenbaugh**
% Sweep = (total sweep – 2 [16' log]) / DIB	% Crook = (deflection / DIB) x (length of crook / log length)
% Sweep = (total sweep – 1 [8' log]) / DIB	

The following table allows for quick assessment of whether a log is merchantable without using the formula. E.g., an 8 ft log with a scaling diameter of 12-in and 6-in departure is 42% merchantable. If the departure for the same log is ≥ 9-in, then the 8 ft log ≥ 67% and therefore the entire 8 ft log is not merchantable due to sweep and is culled.

Table 5.—Sweep deduction from gross scale by length and diameter (in percent; based on rule 3)

Absolute sweep in inches		Scaling diameter, average small end inside bark, in inches											
8-9-10 foot logs	14-15-16 foot logs	8	10	12	14	16	18	20	22	24	26	28	30
—	3	12	10	8	7	6	6	5	5	4	4	4	3
3	4	25	20	17	14	12	11	10	9	8	8	7	7
4	5	38	30	25	21	19	17	15	14	12	12	11	10
5	6	50	40	33	29	25	22	20	18	17	15	14	13
6	7	62	50	42	36	31	28	25	23	21	19	18	17
7	8	—	60	50	43	38	33	30	27	25	23	21	20
8	9	—	—	58	50	44	39	35	32	29	27	25	23
9	10	—	—	67	57	50	44	40	36	33	31	29	27
10	11	—	—	—	64	56	50	45	41	38	35	32	30
11	12	—	—	—	—	62	56	50	45	42	38	36	33
12	13	—	—	—	—	—	61	55	50	46	42	39	37
13	14	—	—	—	—	—	—	60	54	50	46	43	40
14	15	—	—	—	—	—	—	65	59	54	50	46	43
15	16	—	—	—	—	—	—	—	64	58	54	50	47
16	17	—	—	—	—	—	—	—	—	62	58	54	50
17	18	—	—	—	—	—	—	—	—	—	62	57	53
18	19	—	—	—	—	—	—	—	—	—	65	61	57
19	20	—	—	—	—	—	—	—	—	—	—	64	60
20	21	—	—	—	—	—	—	—	—	—	—	—	63
21	22	—	—	—	—	—	—	—	—	—	—	—	67
11-12-13 foot logs													
3		19	15	12	11	9	8	8	7	6	6	5	5
4		31	25	21	18	16	14	12	11	10	10	9	8
5		44	35	29	25	22	19	18	16	15	13	12	12
6		56	45	38	32	28	25	22	20	19	17	16	15
7		—	55	46	39	34	31	28	25	23	21	20	18
8		—	65	54	46	41	36	32	30	27	25	23	22
9		—	—	62	54	47	42	38	34	31	29	27	25
10		—	—	—	61	53	47	42	39	35	33	30	28
11		—	—	—	—	59	53	48	43	40	37	34	32
12		—	—	—	—	66	58	52	48	44	40	38	35
13		—	—	—	—	—	64	58	52	48	44	41	38
14		—	—	—	—	—	—	62	57	52	48	45	42
15		—	—	—	—	—	—	—	61	56	52	48	45
16		—	—	—	—	—	—	—	66	60	56	52	48
17		—	—	—	—	—	—	—	—	65	60	55	52
18		—	—	—	—	—	—	—	—	—	63	59	55
19		—	—	—	—	—	—	—	—	—	67	62	58
20		—	—	—	—	—	—	—	—	—	—	66	62
21		—	—	—	—	—	—	—	—	—	—	—	65

Note: For odd lengths and half inches of sweep, deductions can be interpolated from the figures given.

Source: Grosenbaugh, L. R. 1952. SHORTCUTS FOR CRUISERS AND SCALERS. Occasional Paper 126, Southern Forest Experiment Station, USDA Forest Service

TO DETERMINE THE LENGTH OF A SIDE WHEN THE INTERIOR ANGLE IS KNOWN (SOLVING FOR RIGHT TRIANGLES)

Many times it will be easier to measure along the edge of a potential contrasting condition than across. The following steps and table can be used to determine when the width across an interior corner angle becomes 120 ft wide.

1. Determine interior angle of corner.

2. Refer to table below to find limiting distance along edge of condition.

Interior Angle of Corner	Limiting Distance (FT)
88	86.4
86	88.0
84	89.7
82	91.5
80	93.3
78	95.3
76	97.5
74	99.7
72	102.1
70	104.6
68	107.3
66	110.2
64	113.2
62	116.5
60	120.0

Interior Angle of Corner	Limiting Distance (FT)
58	123.8
56	127.8
54	132.2
52	136.9
50	142.0
48	147.5
46	153.6
44	160.2
42	167.4
40	175.4
38	184.3
36	194.2
34	205.2
32	217.7
30	231.8

The following formula was used to create the preceding table.

Limiting Distance = 60 / SIN (Interior Angle x .5)

See Figure RA_E3 on next page.

EXAMPLE

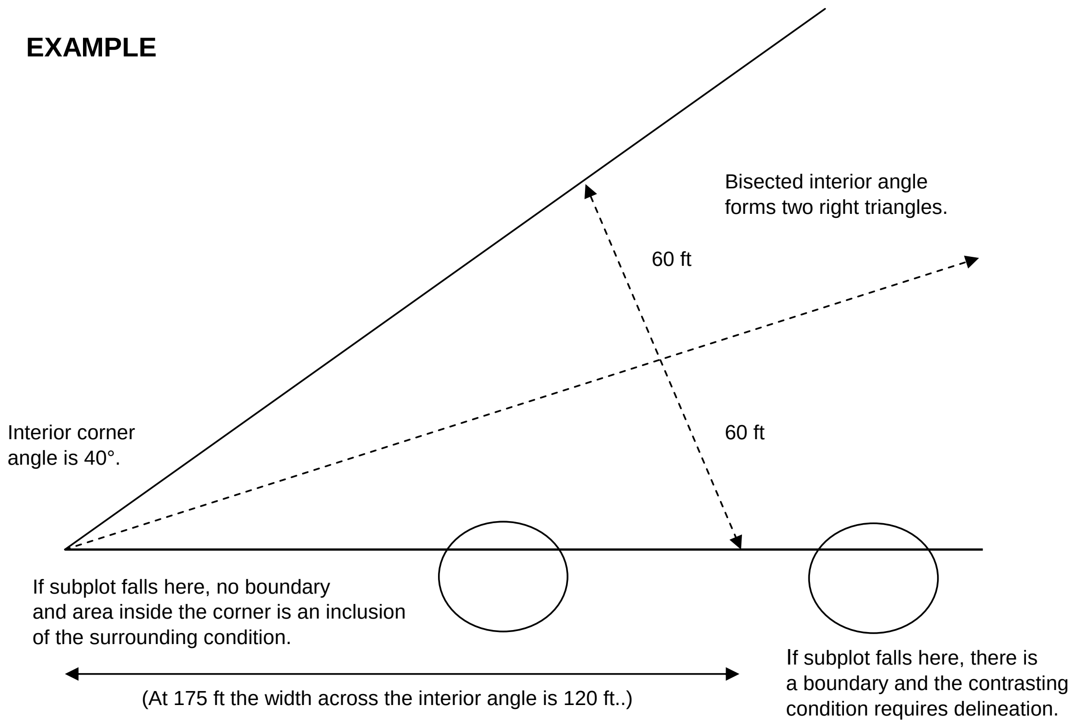


Figure RA_E3.

FOREST LAND PRODUCTIVITY GUIDE

The table below may be used by eastern field crews to assist in the determination of unproductive forest land; that is, land on which the potential productivity is less than 20 cubic feet of industrial wood per acre, per year.

From an increment boring, determine the age class of a tree that is located on the site in question. For example, a 27 year old black spruce in the 20 year age class must be at least 8 feet tall if the site is to be considered as being productive. Sample trees must be representative of the site. The factors of drainage, soils, elevation, and exposure must also be considered.

Total height in feet at upper limit of the unproductive site class

AGE CLASS	BLACK SPRUCE HEIGHT	BLACK ASH HEIGHT	RED MAPLE HEIGHT	CHESTNUT OAK HEIGHT
20	8	12	10	12
30	13	21	17	21
40	19	29	24	29
50	25	34	32	34
60	30	39	37	39
70	33	45	43	45
80	39	50	49	50
90	41	53	53	52
100	43	57	57	56
110	47	60	60	57
120	50	60	61	58
130	51	61	61	59
140	52	62	62	60
150	53	63	62	--
160	--	64	63	--
170	--	65	63	--
180	--	65	63	--

Boring or drilling on plots located in Wilderness areas on National Forests will be done on representative non-tally trees and only when absolutely necessary to estimate site, age, or growth. (This will generally be the case during initial establishment of permanent plots.) [INTRA-AGENCY AGREEMENT 05-SU-FIA01]

Slope Correction in feet
(Distance is measured on slope)

	Feet				
Percent	**50’**	**60’**	**66'**	**70'**	**99'**
10	.25	.3	.3	.3	.5
15	.5	.6	.7	.8	1.1
20	1.0	1.2	1.3	1.4	2.0
25	1.5	1.7	2.0	2.2	3.0
30	2.2	2.6	2.9	3.1	4.4
35	3.0	3.6	3.9	4.2	5.9
40	3.9	4.6	5.1	5.4	7.6
45	4.8	5.8	6.4	6.8	9.6
50	5.9	7.1	7.8	8.3	11.7
55	7.1	8.5	9.3	9.9	14.0
60	8.3	10.0	11.0	11.6	16.5
65	9.6	11.6	12.7	13.5	19.1
70	11.0	13.2	14.6	15.5	21.9
75	12.5	15.0	16.5	17.5	24.7
80	14.0	16.8	18.5	19.7	27.8
85	15.6	18.7	20.6	21.9	30.9
90	17.3	20.7	22.8	24.2	34.2
95	18.9	22.8	25.0	26.6	37.6
100	20.7	24.9	27.3	29.0	41.0

Additional percent slope and distances are available in the next table.

SLOPE CORRECTION TABLE

% SLOPE	Chaining Distances								
	120.0	100.0	98.4	60.0	52.7	49.0	37.2	34.6	24.0
1 - 3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0
6	0.2	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.0
8	0.4	0.3	0.3	0.2	0.2	0.2	0.1	0.1	0.1
10	0.6	0.5	0.5	0.3	0.3	0.2	0.2	0.2	0.1
12	0.9	0.7	0.7	0.4	0.4	0.4	0.3	0.2	0.2
14	1.2	1.0	1.0	0.6	0.5	0.5	0.4	0.3	0.2
16	1.5	1.3	1.2	0.8	0.7	0.6	0.5	0.4	0.3
18	1.9	1.6	1.6	1.0	0.8	0.8	0.6	0.6	0.4
20	2.4	2.0	1.9	1.2	1.0	1.0	0.7	0.7	0.5
22	2.9	2.4	2.4	1.4	1.3	1.2	0.9	0.8	0.6
24	3.4	2.8	2.8	1.7	1.5	1.4	1.1	1.0	0.7
26	4.0	3.3	3.3	2.0	1.7	1.6	1.2	1.1	0.8
28	4.6	3.8	3.8	2.3	2.0	1.9	1.4	1.3	0.9
30	5.3	4.4	4.3	2.6	2.3	2.2	1.6	1.5	1.1
32	6.0	5.0	4.9	3.0	2.6	2.5	1.9	1.7	1.2
34	6.7	5.6	5.5	3.4	3.0	2.8	2.1	1.9	1.3
36	7.5	6.3	6.2	3.8	3.3	3.1	2.3	2.2	1.5
38	8.4	7.0	6.9	4.2	3.7	3.4	2.6	2.4	1.7
40	9.2	7.7	7.6	4.6	4.1	3.8	2.9	2.7	1.8
42	10.2	8.5	8.3	5.1	4.5	4.1	3.1	2.9	2.0
44	11.1	9.3	9.1	5.6	4.9	4.5	3.4	3.2	2.2
46	12.1	10.1	9.9	6.0	5.3	4.9	3.7	3.5	2.4
48	13.1	10.9	10.7	6.6	5.8	5.4	4.1	3.8	2.6
50	14.2	11.8	11.6	7.1	6.2	5.8	4.4	4.1	2.8
52	15.3	12.7	12.5	7.6	6.7	6.2	4.7	4.4	3.1
54	16.4	13.7	13.4	8.2	7.2	6.7	5.1	4.7	3.3
56	17.5	14.6	14.4	8.8	7.7	7.2	5.4	5.1	3.5
58	18.7	15.6	15.4	9.4	8.2	7.6	5.8	5.4	3.7
60	19.9	16.6	16.4	10.0	8.8	8.1	6.2	5.8	4.0
62	21.2	17.7	17.4	10.6	9.3	8.7	6.6	6.1	4.2
64	22.5	18.7	18.4	11.2	9.9	9.2	7.0	6.5	4.5
66	23.8	19.8	19.5	11.9	10.4	9.7	7.4	6.9	4.8
68	25.1	20.9	20.6	12.6	11.0	10.3	7.8	7.2	5.0
70	26.5	22.1	21.7	13.2	11.6	10.8	8.2	7.6	5.3
72	27.9	23.2	22.8	13.9	12.2	11.4	8.6	8.0	5.6
74	29.3	24.4	24.0	14.6	12.9	12.0	9.1	8.4	5.9
76	30.7	25.6	25.2	15.4	13.5	12.5	9.5	8.9	6.1
78	32.2	26.8	26.4	16.1	14.1	13.1	10.0	9.3	6.4
80	33.7	28.1	27.6	16.8	14.8	13.7	10.4	9.7	6.7
82	35.2	29.3	28.9	17.6	15.5	14.4	10.9	10.1	7.0
84	36.7	30.6	30.1	18.4	16.1	15.0	11.4	10.6	7.3
86	38.3	31.9	31.4	19.1	16.8	15.6	11.7	11.0	7.7
88	39.8	33.2	32.7	19.9	17.5	16.3	12.4	11.5	8.0
90	41.4	34.5	34.0	20.7	18.2	16.9	12.8	12.0	8.3
92	43.1	35.9	35.3	21.5	18.9	17.6	13.3	12.4	8.6
94	44.7	37.2	36.6	22.3	19.6	18.2	13.9	12.9	8.9
96	46.3	38.6	38.0	23.2	20.4	18.9	14.4	13.4	9.3
98	48.0	40.0	39.4	24.0	21.1	19.6	14.9	13.8	9.6
100	49.7	41.4	40.8	24.9	21.8	20.3	15.4	14.3	9.9

Regional Appendix F. Tree Class Illustrations

The following illustrations are examples of how to determine TREE CLASS using the "PERCENT BOARD-FOOT CULL" tables for hardwoods and softwoods located in Regional Appendix E.

For the determination of excessive crook and sweep, use the CROOK DEDUCTION IN BOARD FEET or SWEEP DEDUCTION IN BOARD FEET tables located in Regional Appendix E. Note: GROSENBAUGH'S RULE 3 & 4 FOR SWEEP AND CROOK DEDUCTION can also be applied.

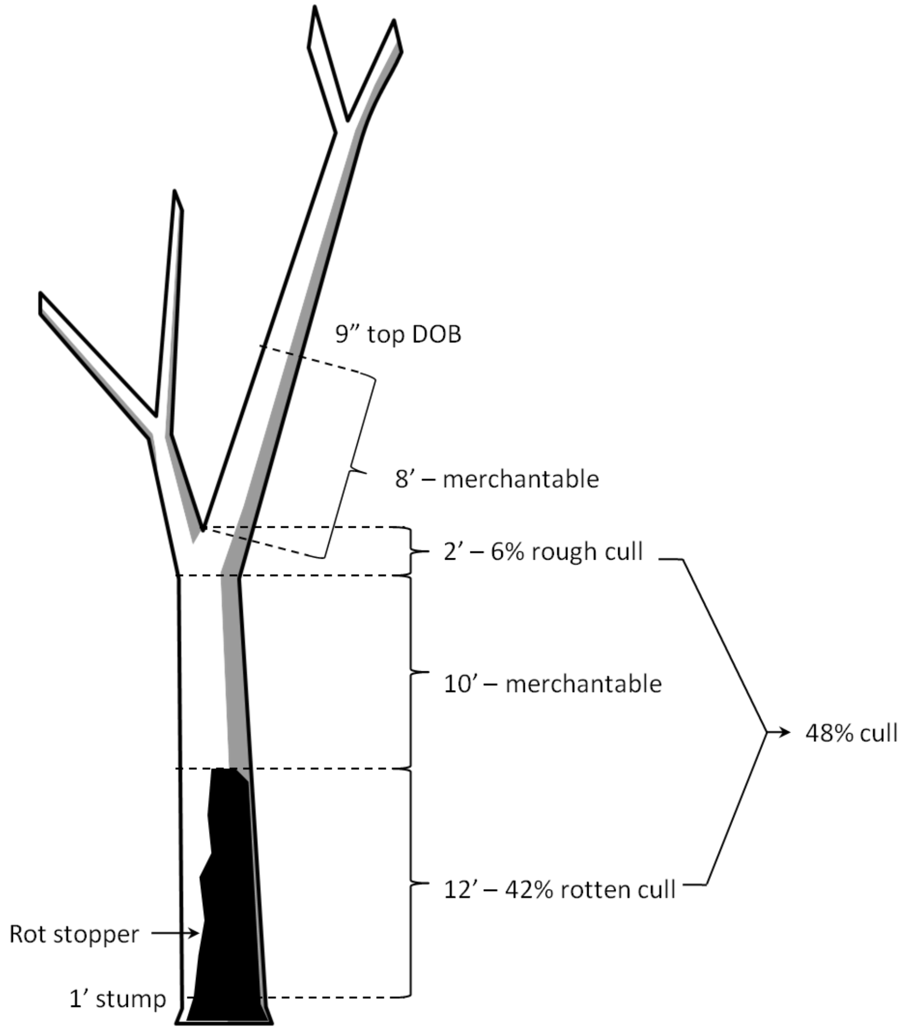


Figure F-1. ***TREE CLASS = 2:*** **This live hardwood tree contains a merchantable 10’ section and a merchantable 8’ section. The bottom 12’ is rotten and contributes 42% rotten board foot cull to the tree. In addition, the fork contributes 6% rough board ft cull for a total non-merchantable volume of 48%. Because the cull is less than 67%, the tree is considered growing stock.**

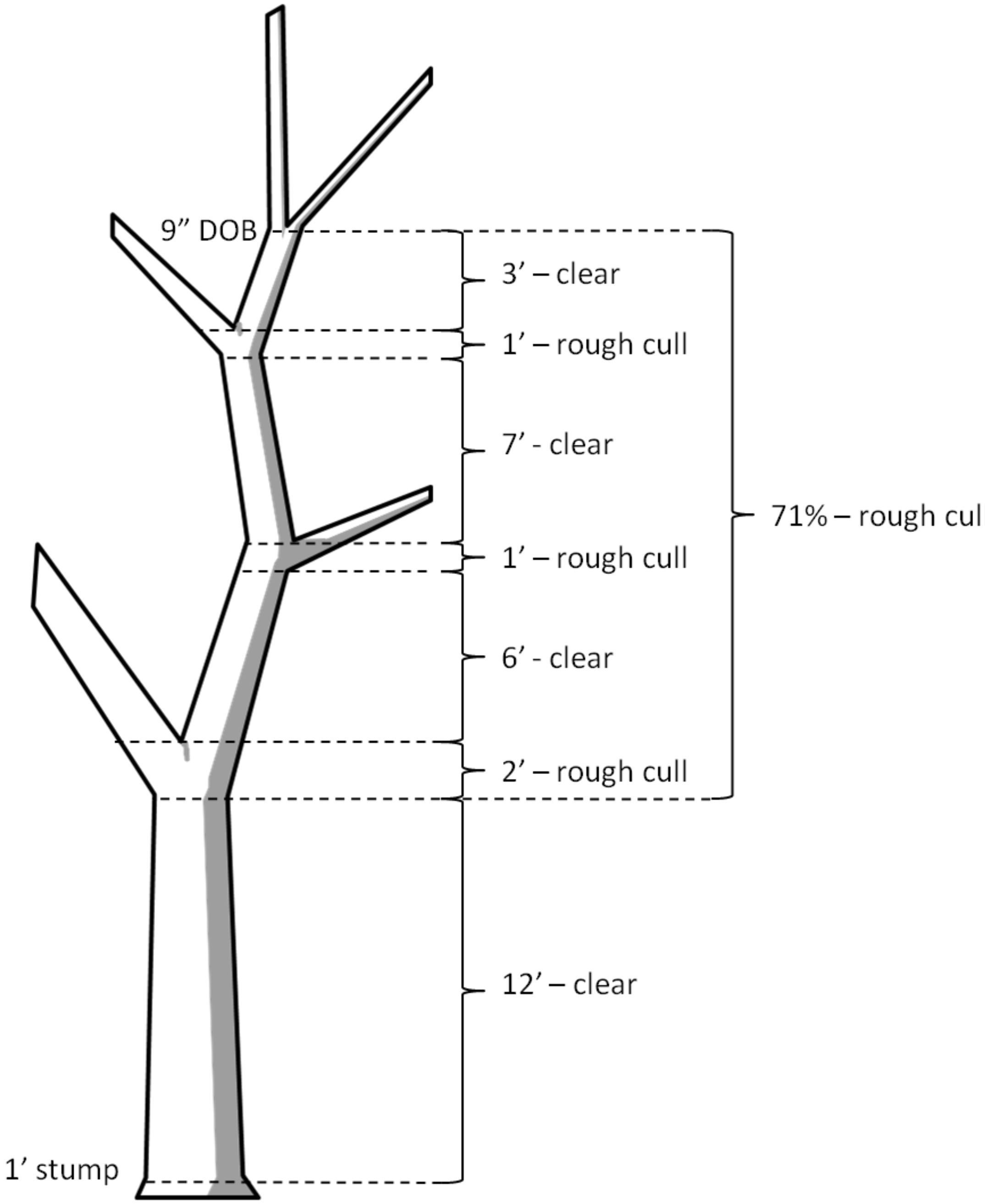


Figure F-2. *TREE CLASS = 3:* This live hardwood tree contains a merchantable 12' section. However, the remaining sawlog is entirely cull. Although the tree meets the minimum merchantability specifications, it contains 71% rough cull and is considered Tree Class 3 because it does not have at least 33% of its volume in merchantable material.

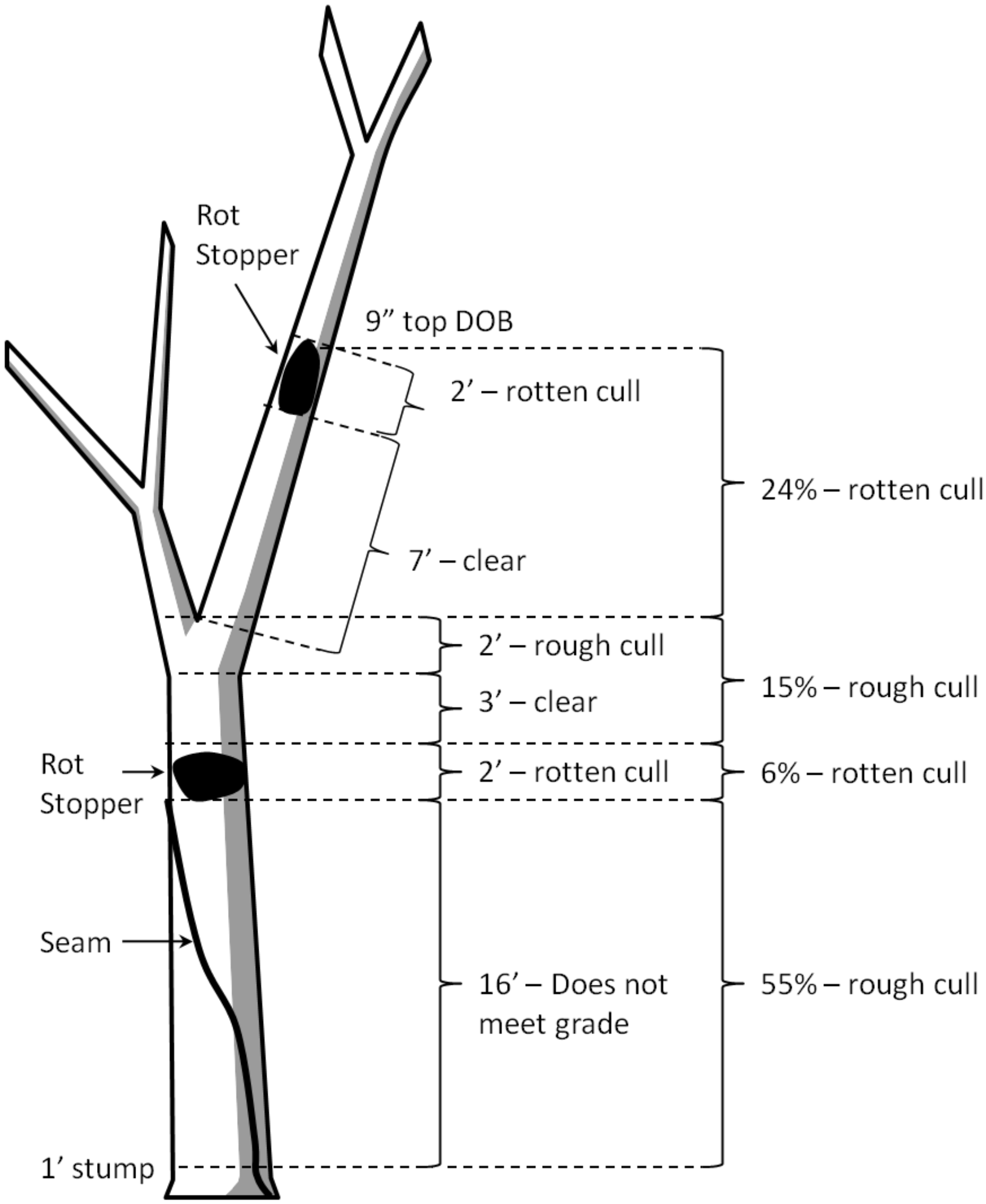


Figure F-3. *TREE CLASS = 3: (hardwood)* – The bottom 16' of this live tree does not meet minimum grade specifications and is not considered merchantable. It contributes 55% rough cull to the tree. There is also a 2' section of rot that contributes 6% rotten cull to the tree. Just above this is a 3' clear section. However, sections that are less than 8 feet in length are considered cull based on the type of stopper (rough or rotten), at the top of the section. In this case, the section is rough cull due to fork. Above the fork is a 7' clear section that is considered rotten cull because of a rot stopper at the top of that section. The tree is entirely cull, the majority of which is rough cull.

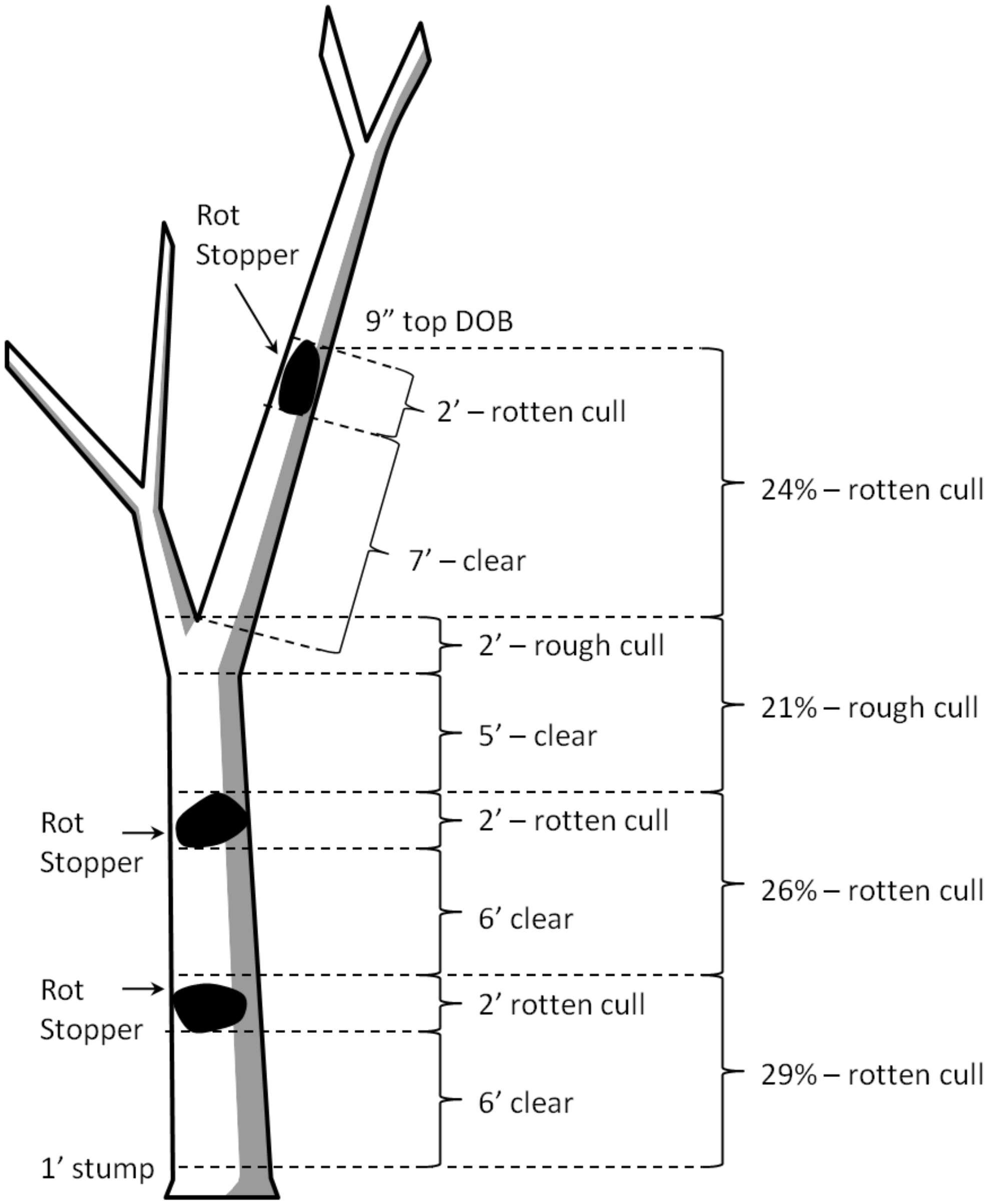


Figure F-4. *TREE CLASS = 4:* This live tree contains no merchantable 8’ or 12’ sections and is therefore considered a cull tree. Clear sections that do not meet the minimum 8’ length requirement are considered cull based on the type of stopper at the top of the section (rough or rotten). In this case, there are two clear 6’ sections on the main stem with rot stoppers at the top of the sections. Thus, the entire bottom 16’ of the sawlog are considered cull. There is also a 5’ clear section with a fork stopper at the top of the section that is considered rough cull. Finally, there is a 7’ clear section on the right fork with a rot stopper at the top of the section that is considered rotten cull. The tree is entirely cull with rotten cull being predominant.

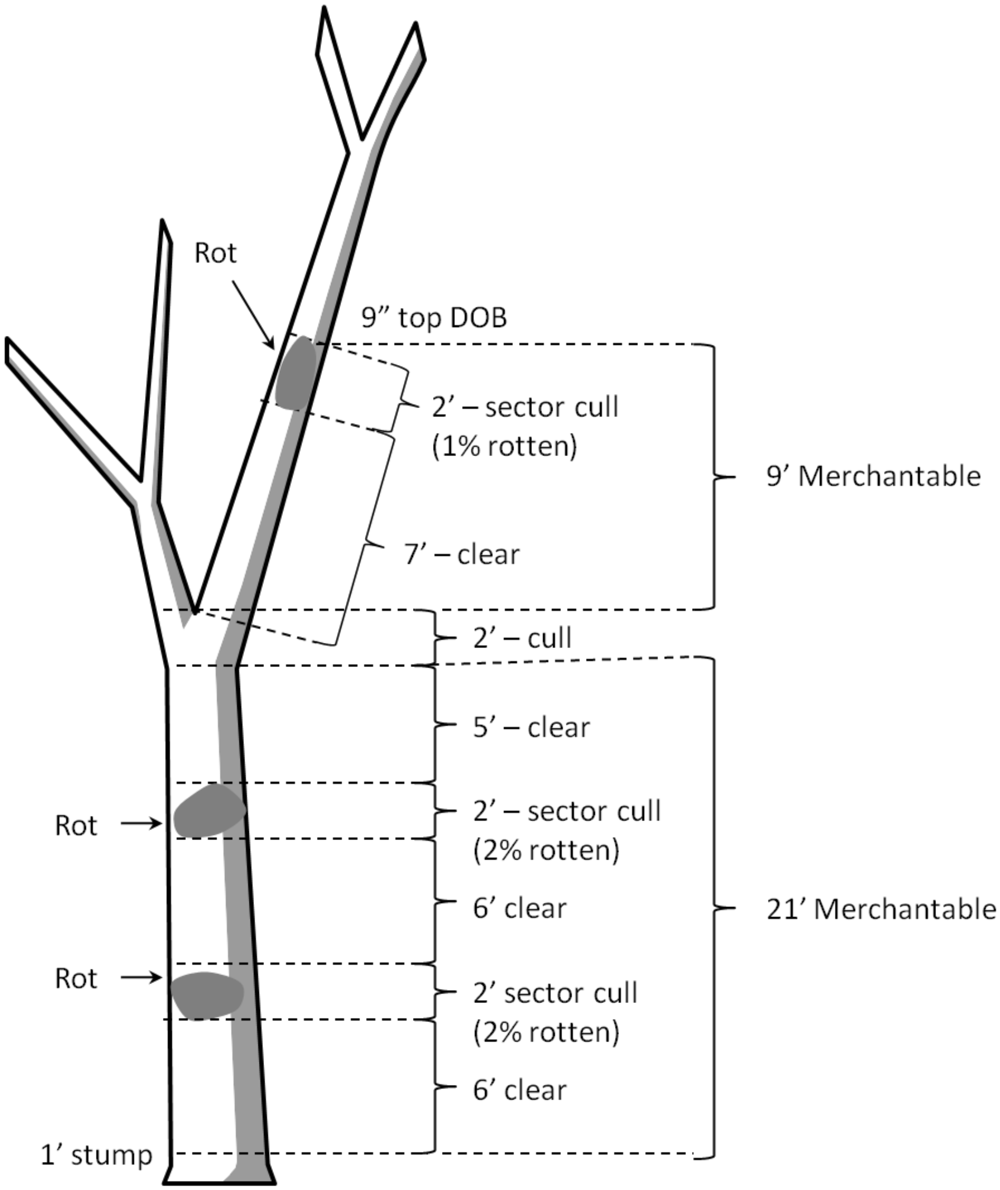


Figure F-5. ***TREE CLASS = 2:*** **This live tree contains rot similar to figure F4. However, in this case the rot is not considered a stopper. Even though there is some deduction for the rot, it does not limit the length of the logs. Assuming the logs otherwise meet minimum grading specifications, the tree is considered growing stock.**

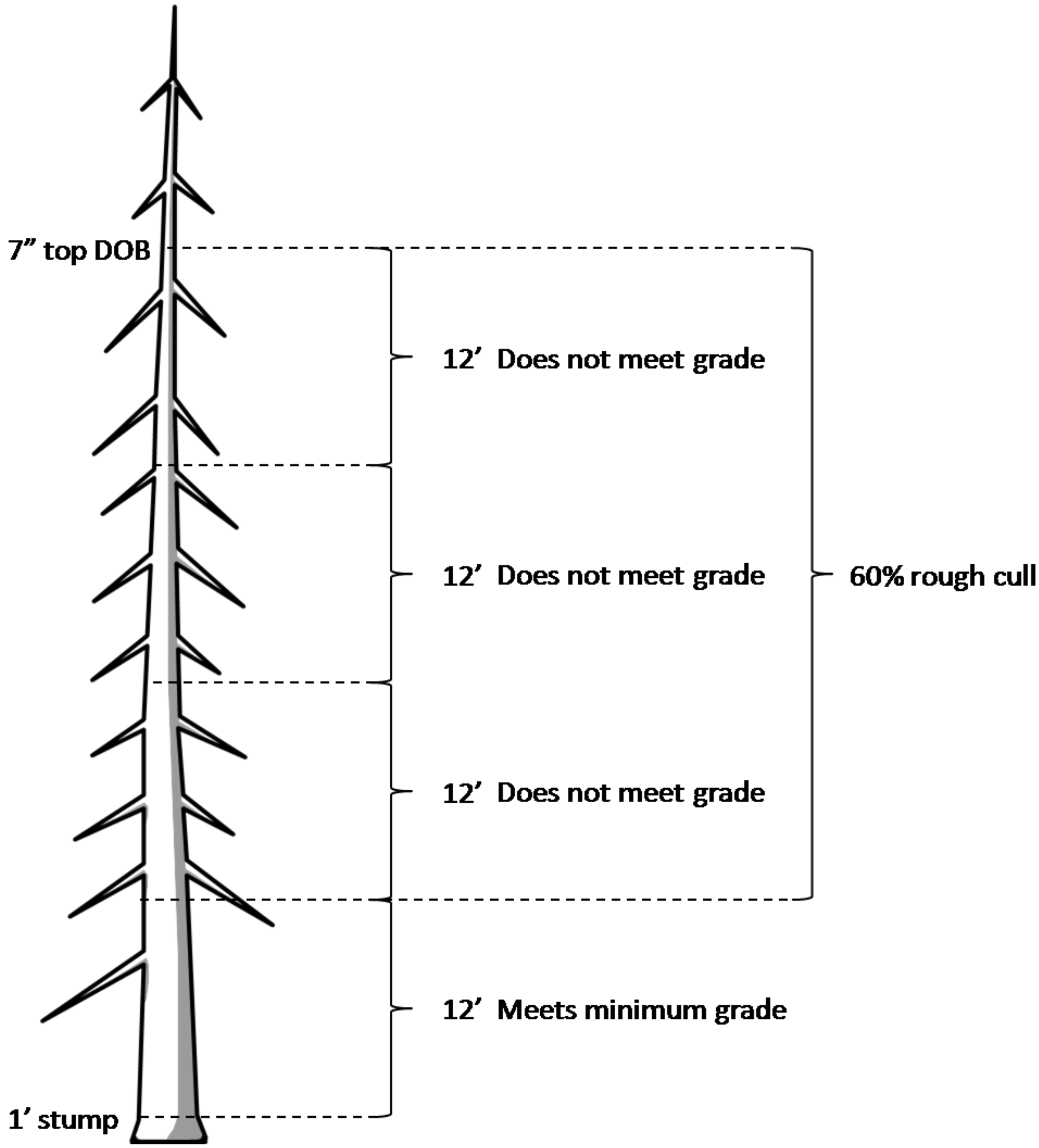


Figure F-5. ***TREE CLASS = 2: (other softwoods - not white, red or jack pine)*** **– Although the sawlog on this live tree is straight and has no “stoppers”, the upper logs do not meet minimum grade specifications because of branch size and are considered rough cull. Because the bottom 12’ section has no rot or defect and is Grade 1, the tree meets minimum merchantability requirements and the section contributes 40% merchantable volume to the tree, thus meeting the 1/3 merchantability requirement for growing stock.**

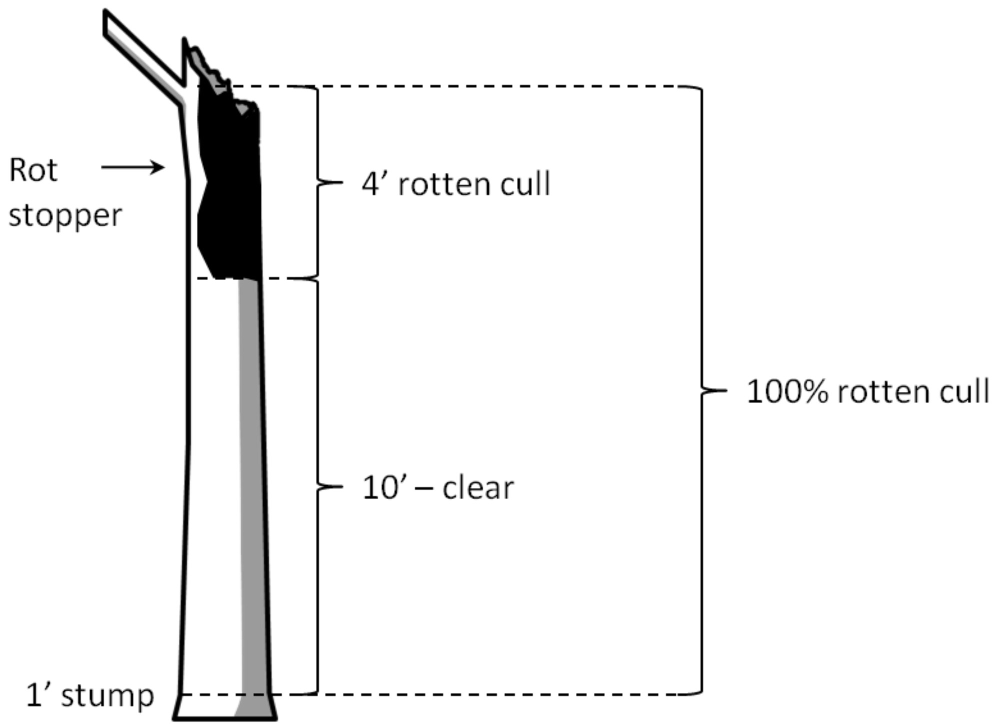


Figure F-6. ***TREE CLASS = 4:*** **In order to meet minimum merchantability requirements, this live tree must contain either a single 12' merchantable log or two noncontiguous 8' merchantable logs. Because this stem is less than 16' in length, we cannot have two 8' sections and therefore cannot consider sections less than the minimum merchantable length of 12' as merchantable. In this case, the 10' clear section is too short to be considered, and is therefore cull because of the rot stopper at the top of the section. The entire stem is considered rotten cull.**

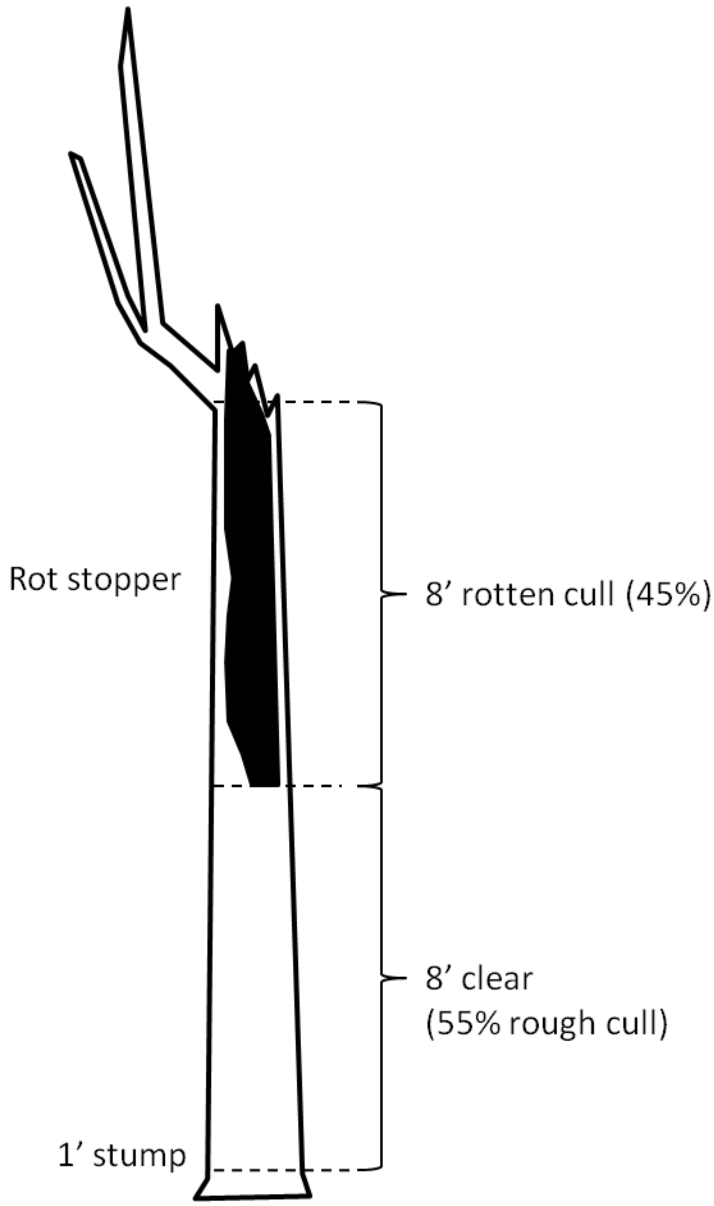


Figure F-7. *TREE CLASS = 3:* In order to meet minimum merchantability requirements, this live tree must contain either a single 12’ merchantable log or two noncontiguous 8’ merchantable logs. Because this sawlog is 16’ in length, we can consider two 8’ sections. However, the upper section is entirely rotten. Even though the tree contains in excess of 1/3 of its volume in merchantable wood, the tree is still considered cull because it does not contain two merchantable 8’ sections. The lower section is considered rough cull only because the minimum merchantability specifications are not met. Because the majority of the cull is rough, the stem is considered Tree Class 3.

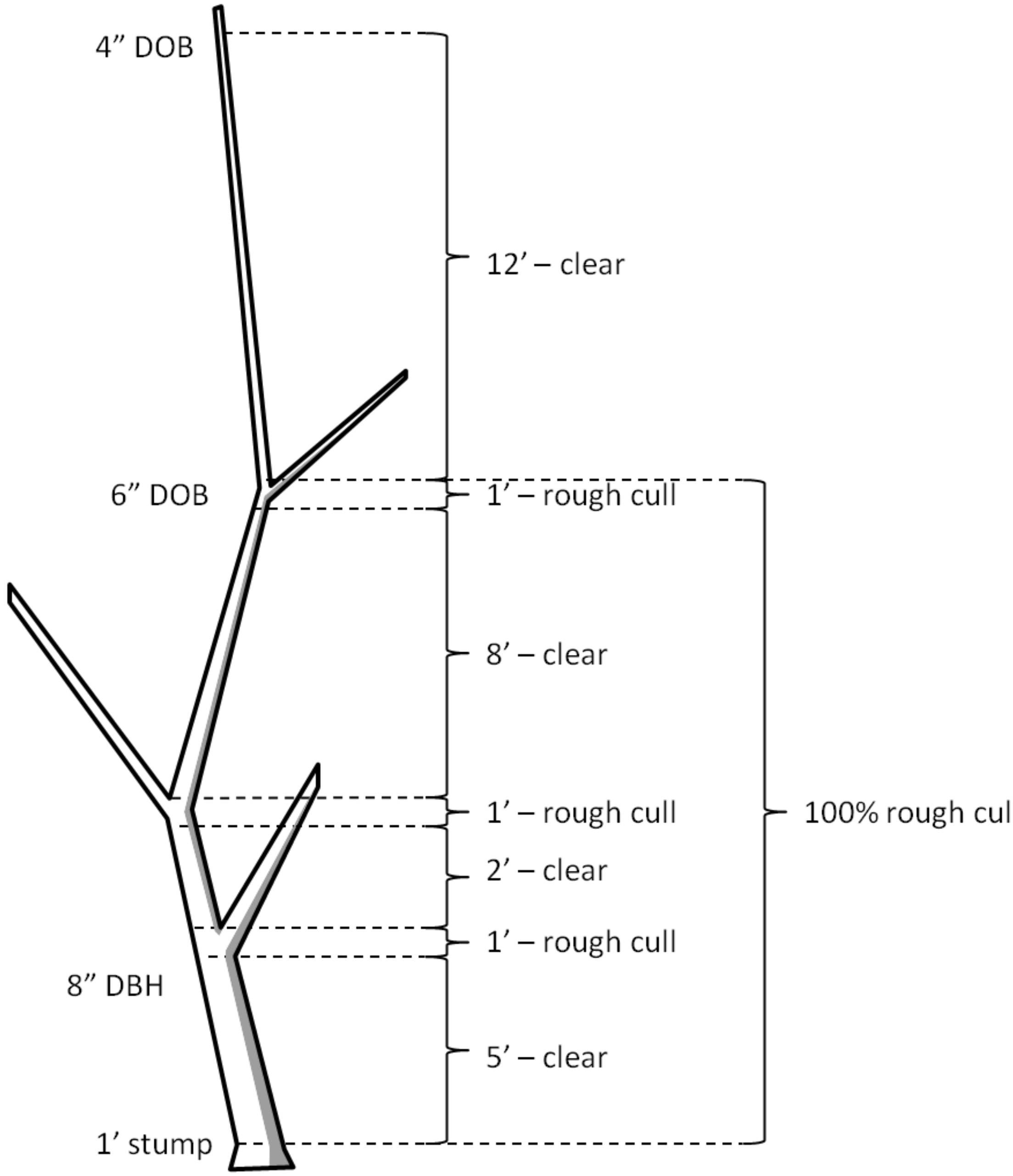


Figure F-8. ***TREE CLASS = 3: HARDWOOD (projecting tree class on live poletimber sized trees) – Initially*****, the tree appears to have a merchantable 8’ and a merchantable 12’ section. However, after applying the 2” rule, the top of the projected sawlog is stopped at the location where the diameter is 6” and does not include the top 12’. This tree will not meet minimum merchantability requirements at the time it reaches sawlog size because it will not have two merchantable 8’ sawlogs or one merchantable 12’ log. However, if at some point in the future the top 12’ section reaches sawlog size, the clear 8’ section would no longer be considered rough cull because minimum merchantability specifications will have been met.**

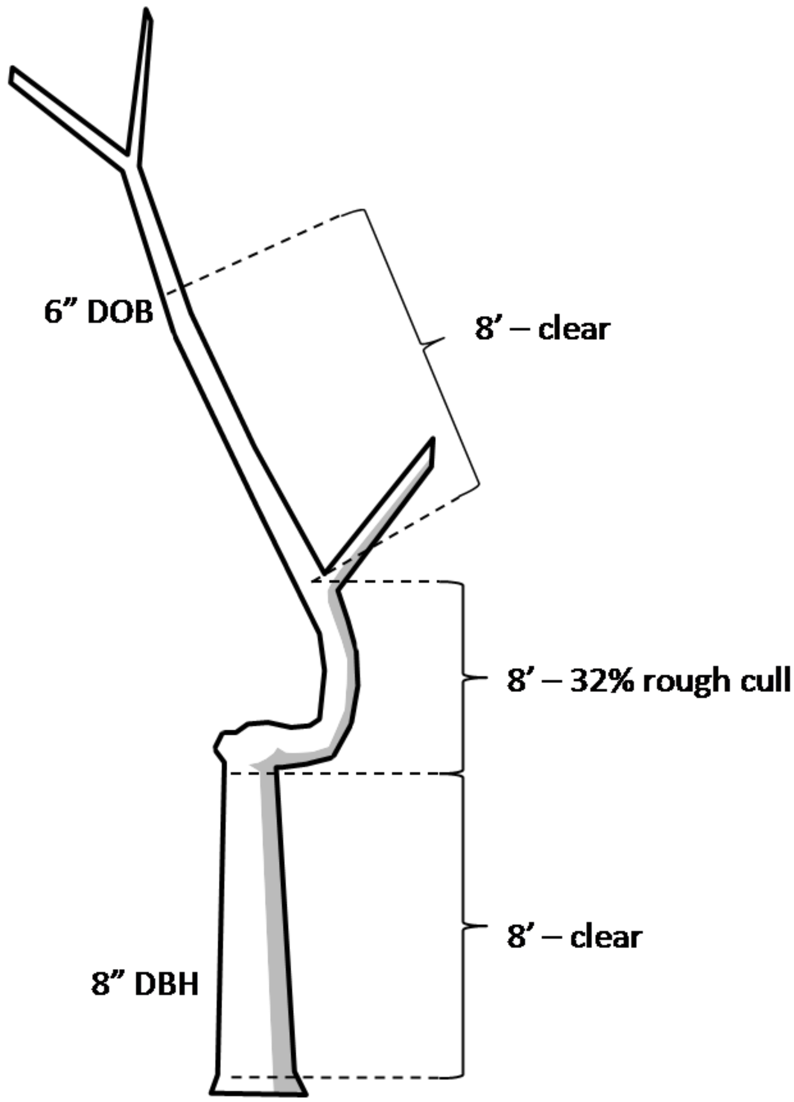


Figure F-9. *TREE CLASS = 2: HARDWOOD (projecting tree class on poletimber sized trees) – Initially*, the tree appears to be non- merchantable. However, the bottom 8' is merchantable and by applying the 2" rule, we can include a second 8' clear section above the fork. The crook and fork contribute only 32% rough cull to the tree. Because the tree will be at least 1/3 merchantable it is considered growing stock.

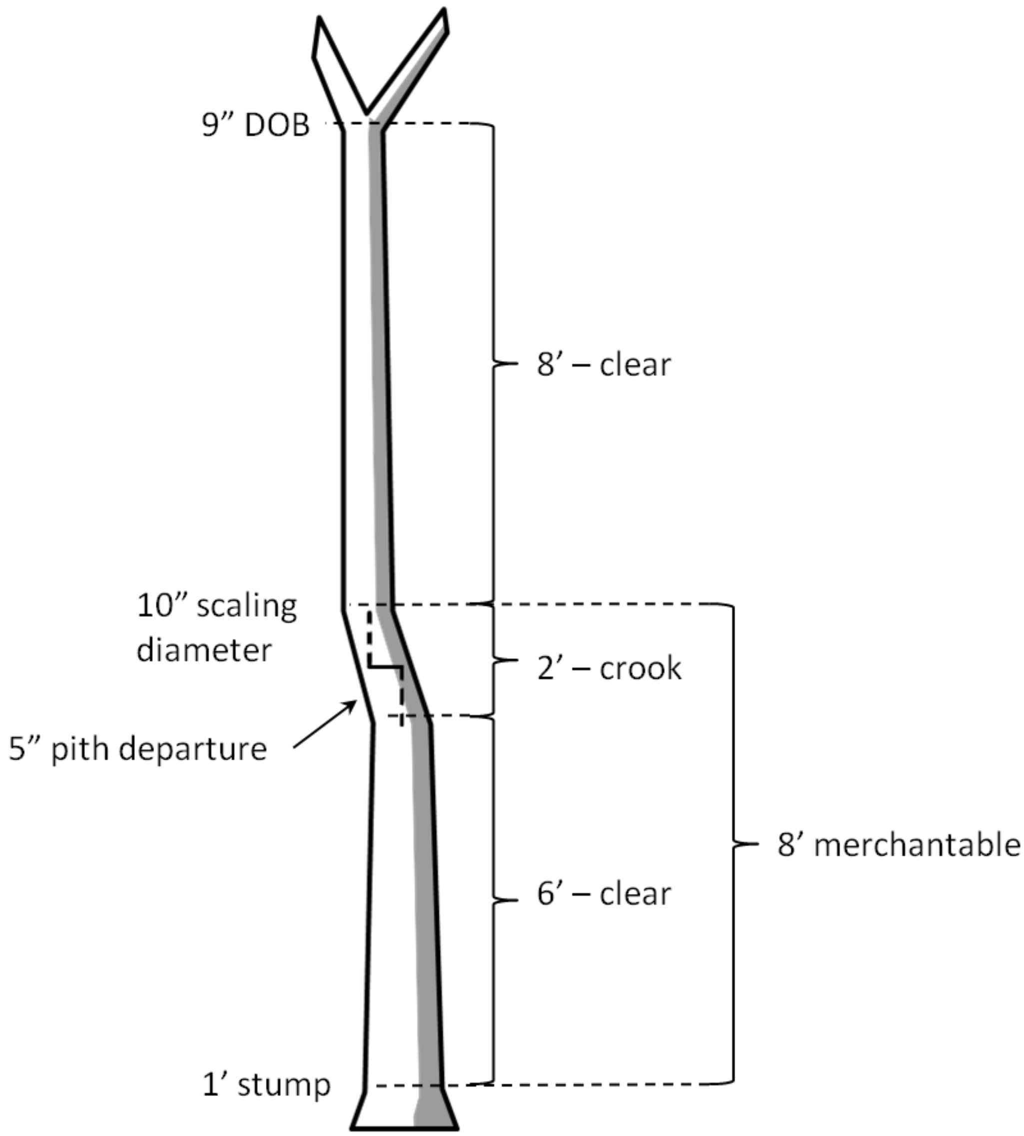


Figure F-9. *TREE CLASS = 2:* For this live sawlog tree, Tree Class depends on whether the crook is considered a stopper. For this determination, refer to the Crook Deduction table in Appendix E. In this case, based on the dimensions given, the crook is not considered a stopper and the entire bottom 8’ section is considered merchantable with roughly 13% cull due to the crook.

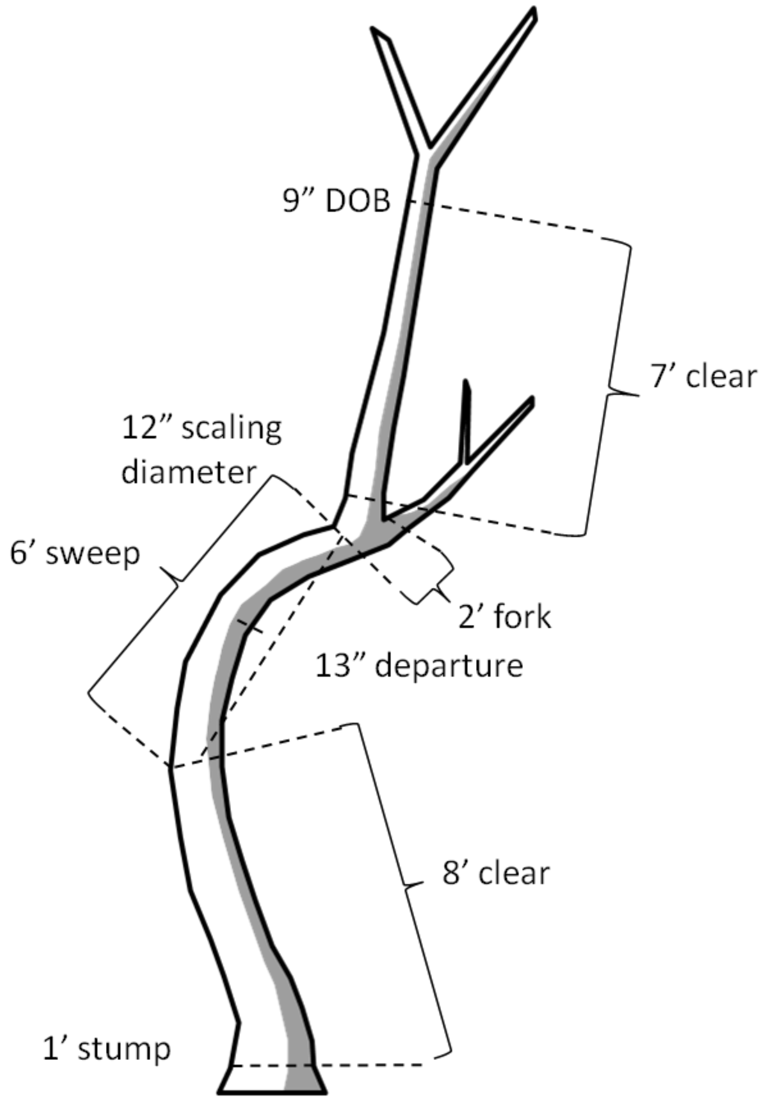


Figure F-10. ***TREE CLASS = 3:*** **For this live sawlog tree, Tree Class depends on whether the sweep is considered a stopper. For this determination, refer to the Sweep Deduction table in Appendix E. In this case, the sweep is considered a stopper and limits the merchantable length of this sawlog to just the bottom 8' section. Because the tree does not contain two merchantable 8' sections or one merchantable 12' section the entire tree is considered cull.**

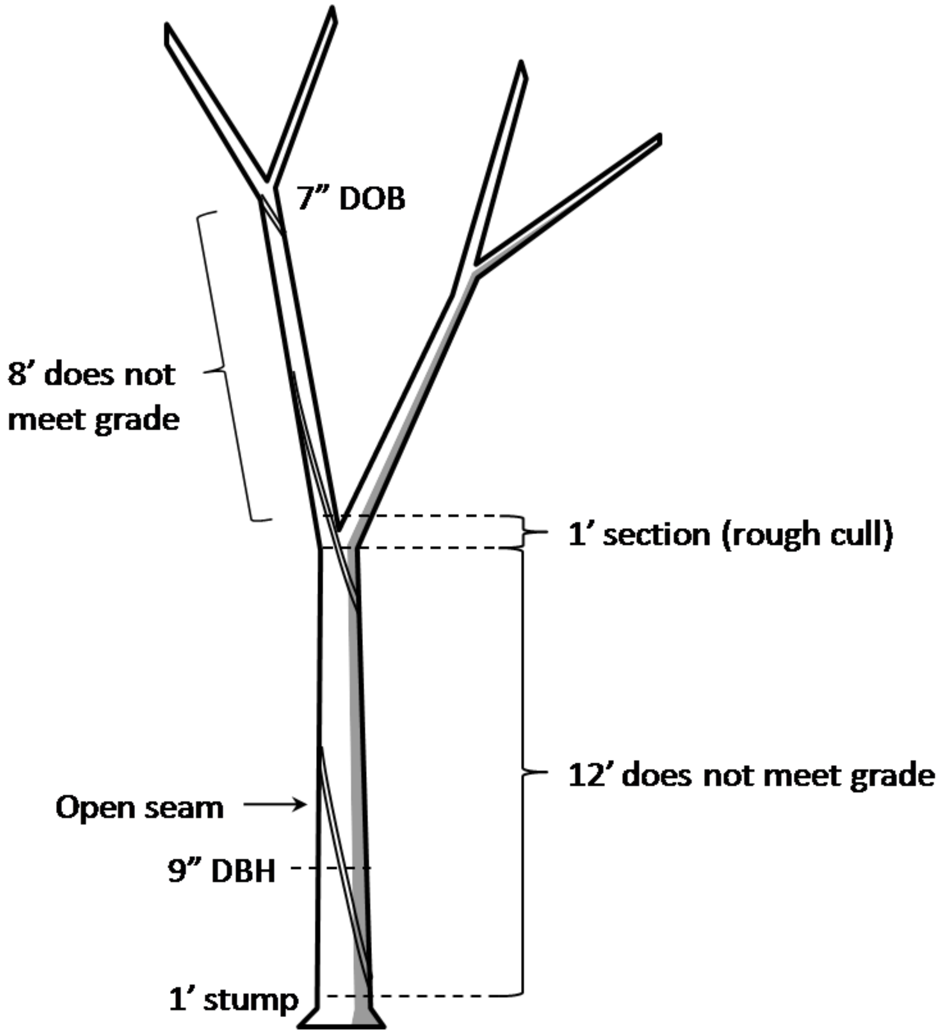


Figure F-11. *TREE CLASS = 3: HARDWOOD (projecting tree class on poletimber sized trees) – Although* this tree initially appears to be merchantable, consideration must be given to the potential for the stem to meet minimum grading requirements when it reaches minimum sawlog diameter. The open spiral seam eliminates any clear cuttings and the tree cannot meet the requirements for grades 1-3 in either the existing or projected sawlogs. Additionally, the presence of a crack or seam is not permitted in the grading section for construction grade 4. Therefore, none of the existing logs in this tree will meet minimum grade specifications and the tree is considered rough cull.

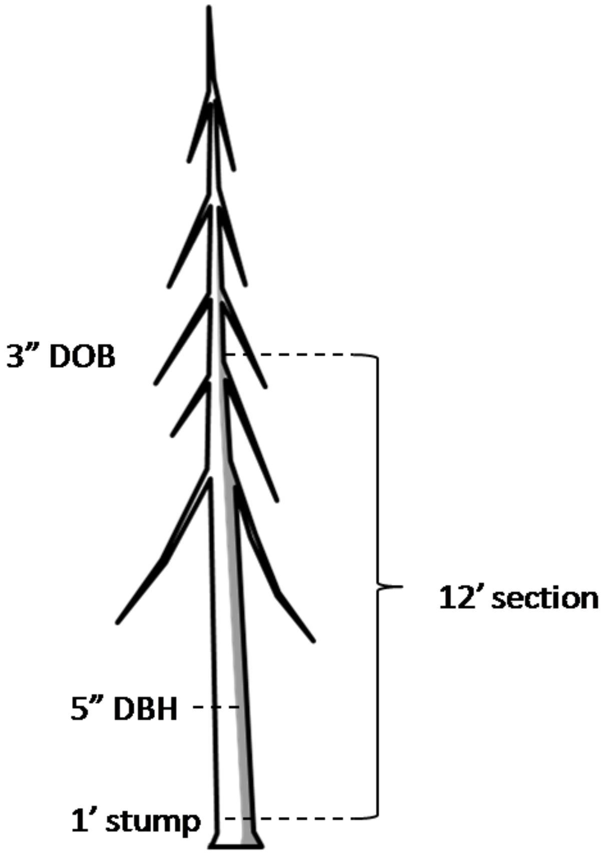


Figure F-12. ***TREE CLASS = 3: OTHER SOFTWOODS (projecting tree class on poletimber sized trees* – There are large branches within the predicted sawlog on this live tree that do not *currently* exceed grading limits. Although it is difficult to predict whether the branches will exceed these limits when the tree reaches sawlog size, such a determination must be made in order to determine if the tree will be considered growing stock. Assume that branches will grow proportionally to the main stem. Although a reasonably accurate estimate can be made for trees that are currently near sawlog size, a wide degree of latitude should be given to smaller trees where branch growth is more difficult to predict.**

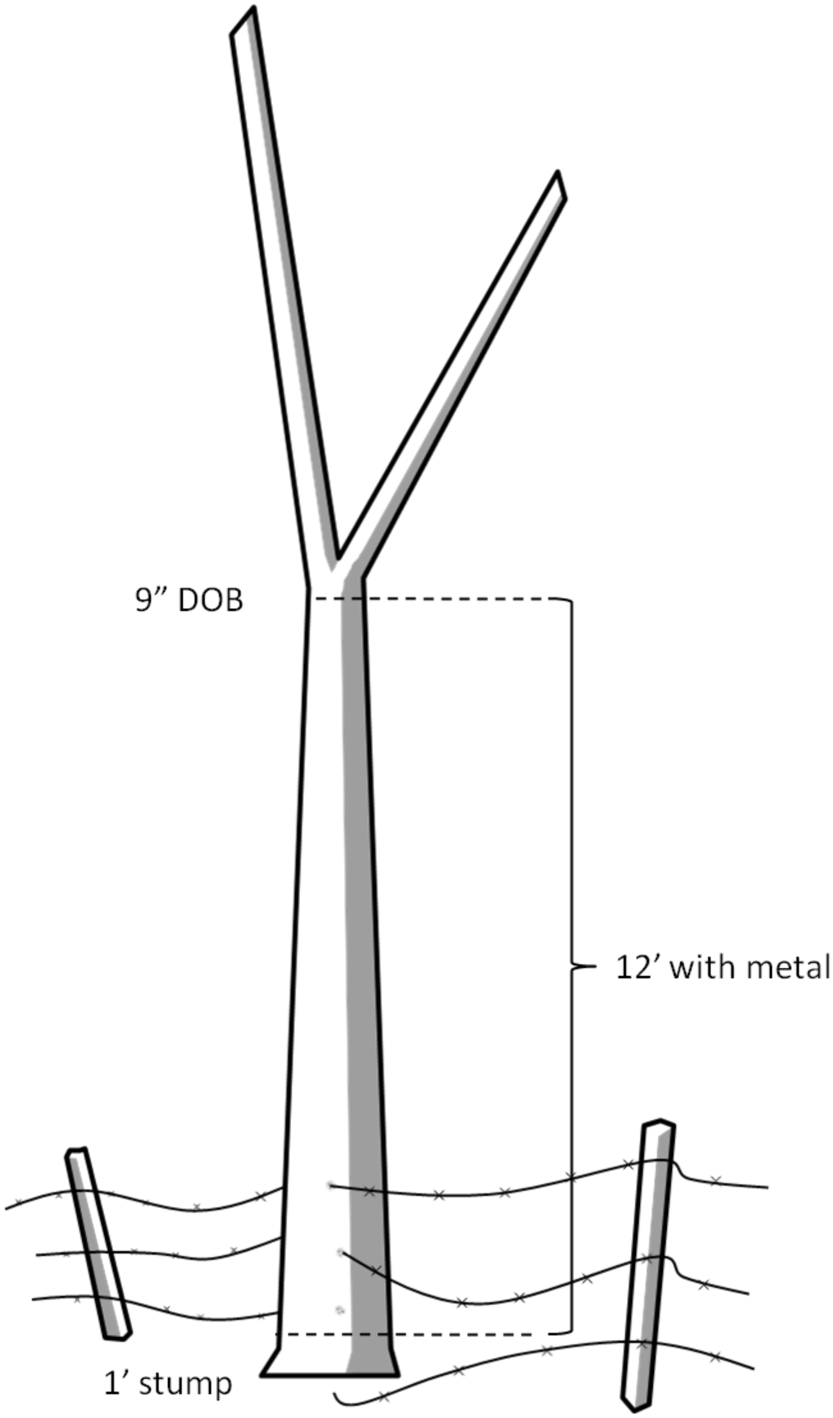


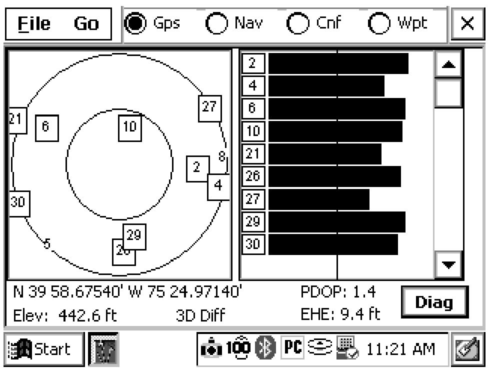
Figure F-12. ***TREE CLASS = 4:*** **Although this tree has what would otherwise be a clear 12' section, the metal in the log presents a unique situation. When metal is found, the section is determined to be "rotten" cull because like rot, sections with metal cannot be utilized. In this case, the 12' section is the only section in the tree and the Tree Class would be 4.**

Regional Appendix G. GPS User's Guide

LandMarkCE GPS NRS-FIA Users Guide

LandMarkCE GPS must be installed on the Allegro using ActiveSync. After installation and license registration, the default LandMarkCE GPS lm.ini file must be updated with the appropriate settings. The latest WMM.COF file (currently valid from 2010-2015) must also be present and finally a Bluetooth GPS receiver bonded to the Allegro. Two of the current GPS receivers being used are the EMTAC mini-S3 and RightWay. Both are 20 channel, WAAS enabled GPS receivers.

To begin using LandMarkCE GPS on the Allegro, click the LandMark CE desktop icon once and then press Enter. Turn on the GPS receiver before initiating "GPS Connect" between the GPS and the Allegro. Once the GPS receiver is on, either click on "File" and then "GPS Connect" on the Allegro screen or click the 'Blue' key and then the 'F5/F10' key to connect the two units via Bluetooth. The screen below will appear as satellites are obtained.

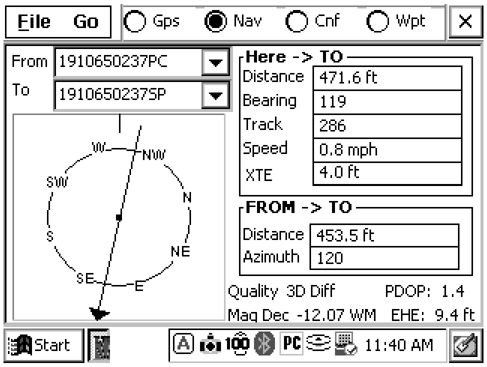


Screen Selection
LandMarkCE GPS has four operational screens that are accessed on the top bar. These are the current GPS location screen (Gps), the Navigation Screen (Nav), the Configuration Screen (Cnf), and the Waypoint Screen (Wpt).

Gps Screen
The Gps screen (shown above) displays the current GPS position and other relevant information. In the upper left is a *Skyplot*, which is a graphical representation of the satellite positions directly overhead. The outer circle represents the horizon and the inner circle is 60° above the horizon. The satellites are displayed by their unique satellite number. Satellites used to compute the current GPS position are shown in a square. When GPS receiver is used, WAAS satellites are tracked but not displayed in the *Skyplot*. To the right of the *Skyplot* is the *satellite signal strength* graph. The vertical bar represents 50% of maximum power. Below the *Skyplot* are the current coordinates, elevation, GPS Quality (2D, 3D, 2D Diff, 3D Diff, No Fix, No Comm. Act.), the PDOP, and the EHE. The *Diag* box shows individual satellite details and NMEA string data.

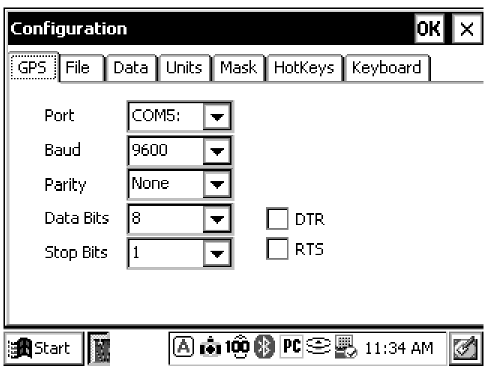
Nav Screen

The Nav screen allows users to calculate distances and azimuth between points and navigate to a location. The upper left portion of the screen contains *two drop down lists* of saved waypoints or the current "Here" position.
The *From* and *To* lists are used to select waypoints from which the calculations will be performed. Below the waypoint drop down lists is the *compass*.
The *compass* rotates to show the direction of travel once you start moving. The arrow always points toward the *To* location.
The *compass* body rotates to show the current direction of travel.
The *Here* → *To* section shows calculated values based on the current GPS location and the destination (To) location.



The *From* → *To* section displays the calculations based on the *From* location to the *To* location. Use this section when calculating course-to-plot distance and azimuth between a saved SP waypoint and a saved PC waypoint.
Displayed at the bottom of the *Nav* screen are the GPS Quality, heading setting, PDOP and EHE values.

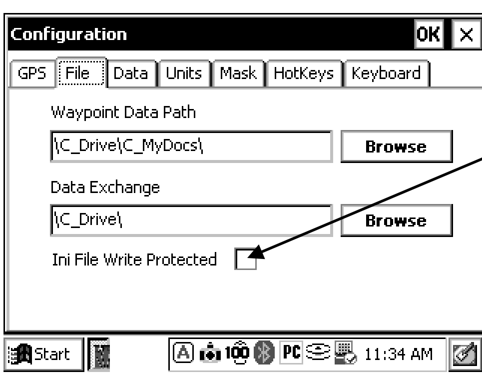
Cnf Screens



The Cnf screen allows customization of critical LandMark CE settings.

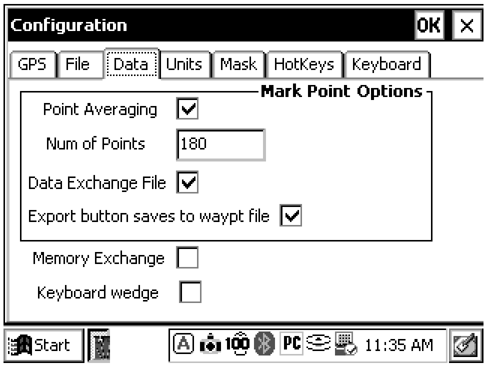
The first screen to appear is the *GPS* screen. The only option that needs changed here is the Com Port. It must match the Bluetooth Com Port setting when the GPS receiver was bonded to the Allegro. It may vary from unit to unit. ***When the Com Port is changed, LandMark CE must be shut down and restarted***.

The other defaults that never need changed are: Baud=9600, Parity=None, Data Bits=8, Stop Bits=1. DTR and RTS do not need selected when using an EMTAC GPS receiver.



The *File* tab displays where waypoints and data are stored on the Allegro.

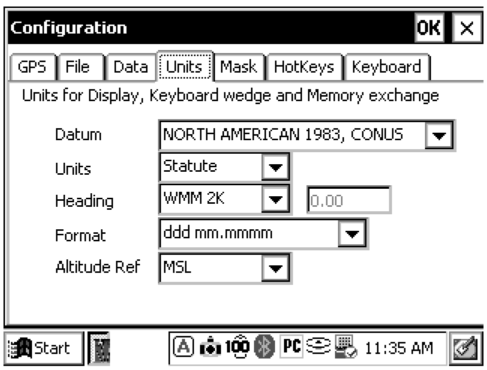
When *the Ini File Write Protected* box is checked, the critical GPS settings have been locked and cannot be changed by the user. This is a security measure to insure the GPS data is collected with the highest accuracy and confidence.



The *Data* tab defines how the waypoints are collected and how they are stored.

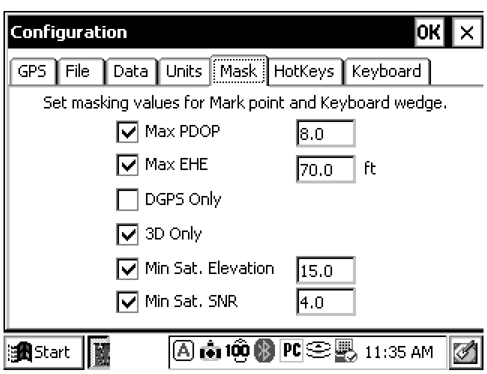
FIA will record data that is the average of 180 individual fixes.

The *Data Exchange File*, *Memory Exchange* and *Keyboard wedge* functions will be implemented at a future date.



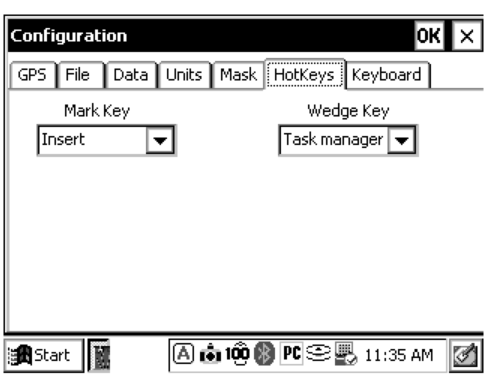
The *Units* tab is used to format the GPS data.

The critical settings that FIA uses for Datum, Units, Heading, Format, and Altitude Ref. are displayed on the graphic to the left.



The *Masks* tab is used to set GPS signal masking parameters when marking waypoints. Only the GPS signals that meet the specified criteria will be used in the waypoint averaging solution.

The critical settings that FIA uses for *Max PDOP*, *Max EHE, DGPS, 3D Only, Min. Sat. Elevation*, and *Min. Sat. SNR* are displayed on the graphic to the left.



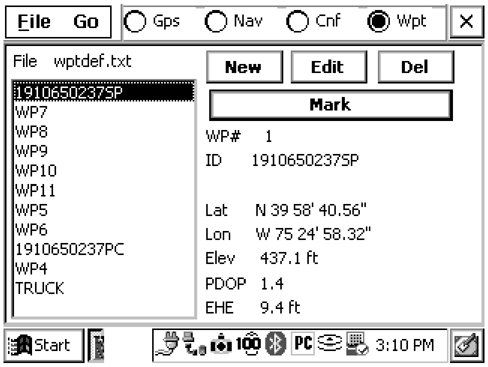
The *HotKeys* tab is used to assign an automatic function to a specific button on the Allegro.

Insert selected in Mark Key jumps to the collect waypoint screen whenever the "Ins" button on the Allegro keypad is pressed while LandMarkCE is running.

The Wedge Key option is not currently used.

The *Keyboard* tab is not used.

Wpt Screens



The *Wpt* screen is used to display, edit, manage and collect GPS waypoints.

On the left side of the screen are the saved waypoints. A default filename can be used (as shown) or a unique name such as plot number, SP, PC, etc. To select a waypoint, click on it.

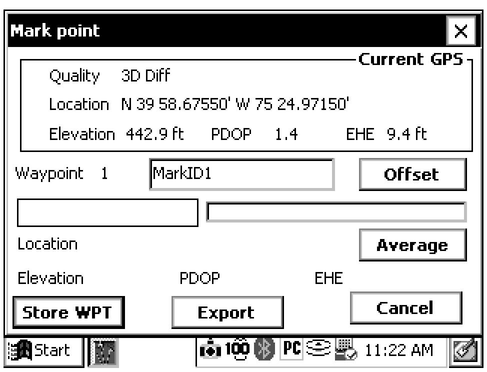
The *New* button opens a screen where coordinates can be entered.

The *Edit* button opens a saved waypoint. Here you can change a waypoint name or apply a coordinate *Offset*.

The *Del* button is used to delete a previously select waypoint from the list. Waypoints can only be deleted one at a time.

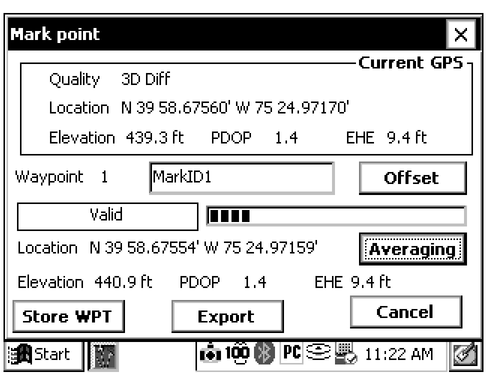
The *Mark* button is used to open the *Mark Waypoint* screen to start the averaging waypoint function.

Below the *Mark* button are the GPS details of the selected waypoint.



To compute an Offset location to PC, press the *Offset* button and enter the distance, direction and slope (+ or -) to PC prior to pressing *Export.* The Offset coordinates will be stored as the Average.

To average waypoints, press the Insert key (Ins) on the Allegro keypad or click the Mark button in the *Wpt screen,* then click Export.



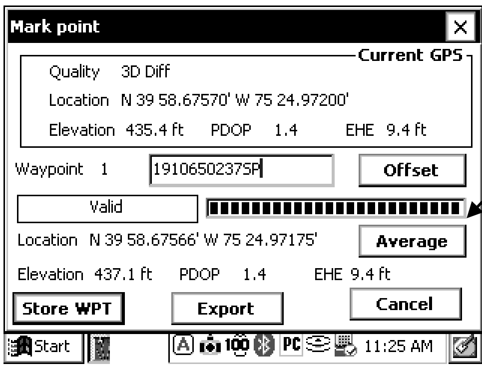
The top box displays the current, single fix GPS data.

Below the Current GPS is the default waypoint name (editable) and a button to apply an Offset (distance, direction, slope) to the averaged coordinates.

Next is a box that displays whether or not the current GPS fix will be valid, based on the GPS masks set up in the *Cnf screen*.

A *Progress Bar* appears when averaging to show the solution progress based on the number of fixes indicated in the *Cnf/Data screen*. Below the status bar is the running average section displaying the coordinates, elevation, PDOP and EHE.

To begin averaging, click the *Export* button. The word “Average” will change to “Averaging”. The status bar will progress as valid fixes are used in the solution. When complete, the word “Averaging” will change back to “Average”. During averaging, hold the GPS receiver stationary over the point until the process is complete.



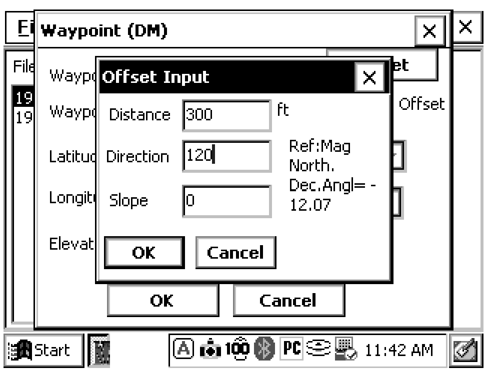
This screen shows that the Averaging process is complete.

The *Progress Bar* is completely fill in and the Average box has changed from “Averaging” back to “Average”.

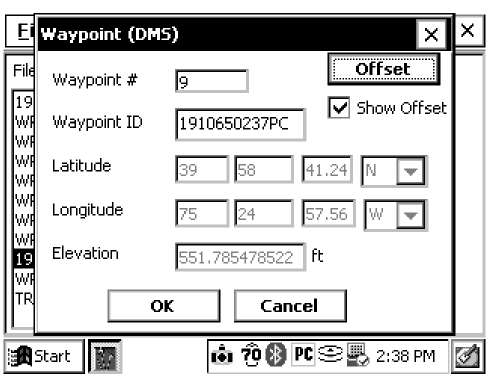
Only the last averaged coordinates are saved in a Data Exchange File (dtex.txt) on the Allegro. This file is accessed though MIDAS to transfer GPS data into a field plot. The dtex.txt file is deleted and refreshed each time the *Export* tab is used.

Click **Ctrl+K** on the Allegro to auto-populate GPS data from the Data Exchange file into the Midas Starting Point or Plot Center GPS screens.

Computing An Offset

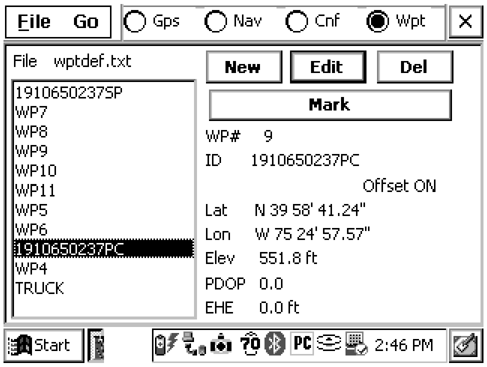


To compute the coordinates of an offset location (i.e. PC cannot be occupied), save your current location as a “180 fix” averaged waypoint. In the Wpt Screen, highlight the previously saved waypoint. Press Edit and then the Offset button. When the Offset Input screen appears, enter the distance, compass direction and slope to the unknown point. Press *OK* and the Waypoint screen will appear with the calculated offset position shown in a lighter font.



You can toggle between the original and offset coordinates by tapping the Show Offset box. To completely remove the offset calculation, press the Offset button and type “0” for distance, direction and slope.

If the offset is not removed, the offset calculation will continued to be displayed on the Wpt screen.



<u>LandMarkCE GPS / GPS Receiver / MIDAS FAQs</u>

Q. How do my GPS coordinates get saved in a MIDAS plot file?
A. Within 15 minutes of pressing “Export” in LandMarkCE GPS, open the corresponding plot file in MIDAS and go to the PC GPS screen. On the Allegro, press the CTL button, then the K button. The GPS fields should auto-fill with the last GPS coordinates collected.

Q. I am getting an error soon after Jan. 1 when pressing the Nav button in LandMarkCE GPS?
A. The WMM.COF file which models magnetic declination must be updated periodically from the NOAA website. The current version is valid from 2010-2015.

Q. I just installed LandMarkCE GPS on the Allegro, but the GPS receiver isn’t communicating with the Allegro?
A. After installing LandMarkCE GPS, the lm.ini file must be updated and the proper BT COM Port set. The GPS receiver must also be turned on before LandMarkCE GPS is started. Make sure both the GPS receiver blue and green lights are flashing.

Q. My GPS receiver <u>was</u> communicating fine with LandMark CE and then it just stopped and displayed “No Comm. Act.”?
A. There has been some type of interruption in the Bluetooth signal between the GPS receiver and Allegro. On the Allegro, press the blue button and the F10 key to reconnect. Make sure both GPS receiver blue and green lights are flashing.

Q. The blue or green lights on my GPS receiver quit working?
A Switch the GPS receiver unit on and off until both lights are on.

Q. LandMarkCE GPS doesn’t always display that I am getting a “3D Diff” fix?
A. The GPS receiver is capable of picking up two geostationary FAA satellites (WAAS) that broadcast real- time, differential GPS corrections. The two WAAS satellites are positioned near the equator over the Atlantic and Pacific Oceans. Based on your Latitude and view of the sky, the GPS receiver may be able to “see” these satellites. GPS fixes that are differentially corrected are more accurate than a “3D Only” fix. The WAAS satellites are not displayed on the Skyplot when using the EMTAC or RightWay receivers.

Q. I can’t change the critical settings in the Cnf screens?
A. The critical setting are locked to prevent the field user from changing them.

Q. I pressed the Insert key (Ins) on the Allegro, but LandMarkCE GPS won’t start Averaging?
A. The Ins key switches to the *Mark Screen*, but you must click the box that shows “Export” to begin averaging.

Q. How do I calculate the coordinates of PC when using an offset from another location?

A. Before averaging at the offset location, click *Offset* on the *Mark Screen*. Enter the distance, direction and slope (+ or -) to PC. Click OK. Click *Export* and the position will be saved with the offset calculation applied. In the Wpt screen, the words “Offset ON” will be displayed when viewing the waypoint details.

Q. How do I minimize LandMarkCE GPS when it is open?
A. Tap the LandMarkCE GPS icon on the bottom taskbar. You may need to make the taskbar visible first.

Appendix H. Tally Item Guides

TALLY ITEM GUIDES

Some Data items may still reflect Field Guide 4.0 Data Requirements. Refer to data item protocol within the Field Guide for detailed requirements.

Plot Data	*Data Element*	*PDR Prompt*	*Data Required*		
	Cycle	CYCL	X	X	X
	Sub-cycle	SUBC	X	X	X
	State	ST	X	X	X
	Unit	UNIT	X	X	X
	Plot Number	PLT#	X	X	X
	Plot Status	**STAT**	**1**	**2**	**3**
	Plot Nonsampled Reason	REAS			X
	Subplot Examined	EXAM		X	X
	Sample Kind	SK	X	X	X
	Current Year	YEAR	X	X	X
	Current Month	MONT	X	X	X
	Current Day	DAY	X	X	X
	Horizontal Distance to Road	RDIS	X		
	Water on Plot	WTYP	X		
	QA Status	QAST	X	X	X
	Crew Number	CREW	X	X	X
	Cruiser	CRUI	X	X	X
	Tallier	TALL	X	X	X
	One or Two Person Crew	CRSZ	X	X	
	Plot Season	SEAS	X	X	

X Data required

GPS Data	*Date Element*	*PDR Prompt*	*Data Required*	
	Unit Type	**UNIT**	**0**	**2**
	GPS Serial Number	GPS#		X
	Latitude	LAT		X
	Longitude	LONG		X
	Azimuth to Plot Center	AZM		X
	Horizontal Distance to Plot Center	DIST		X
	GPS Elevation	ELEV		X
	GPS Error	ERRS		X
	GPS PDOP	PDOP		X
	Number of Readings	READ		X

X Data required

Site Tree Data	*Data Element*	*PDR Prompt*	*DR*
	Condition Class List	CONL	X
	Species	SPP	X
	Diameter	DBH	X
	Site Tree Length	HGHT	X
	Tree Age at Diameter	AGE	X
	Subplot Number	SUB#	X
	Azimuth	AZM	X
	Horizontal Distance	DIST	X

X Data required for all newly defined conditions that do not have previous SI data.

	Data Element	***PDR Prompt***	***Data Required***				
Condition Data	Condition Class Number	CON#	X	X	X	X	X
	Condition Class Status	**STAT**	**1**	**2**	**3**	**4**	**5**
	Condition Nonsampled Reason	REAS					X
	Reserved Status	RESV	X				
	Owner Group	OWNG	X				
	Forest Type	FTYP	X				
	Stand Size	STSZ	X				
	Artificial Regeneration Status	SORI	X				
	Tree Density	DENS	X				
	Owner Class	OWNC	X				
	Industrial Owner Status	INDU	X				
	Artificial Regeneration Species	SOSP	Y				
	Stand Age	SAGE	X				
	Disturbance 1, 2, and 3	DIS123	X				
	Disturbance Year 1, 2, and 3	DYR123	X				
	Treatment 1, 2, and 3	TRE123	X				
	Treatment Year 1, 2, and 3	TYR123	X				
	Stand History	HIST	X				
	Physiographic Class	PHYS	X				
	Productivity	PROD	X				
	Present Nonforest Land Use	NFLU		X			
	Nonforest Trees	NFTR		X			
	Stand Structure	MEST	ME				
	Canopy Cover Sample Method	CCSM	X	X			
	Live Canopy Cover	LCC	X	X			
	Live Plus Missing Canopy Cover	LMCC	X	X			
	Total Stems	STEM	X	X			

X Data required
ME ME only

	Data Element	***PDR Prompt***	***Data Required***		
Subplot Data	Subplot Staus	**STAT**	**1**	**2**	**3**
	Subplot Nonsampled Reason	REAS			X
	Subpltot Center Condition	SCEN	X	X	
	Microplot Center Condition	MCEN	X	X	
	Subplot Slope	SLOP	X		
	Subplot Aspect	ASP	X		
	Snow / Water Depth	SWD	X		
	Crown Closure	MECC	ME		

Boundary Data	Plot Type	TYPE	Y	Y	
	Boundary Change	CHNG*	Y	Y	
	Contrasting Condition	CCON	Y	Y	
	Left Azimuth	LAZM	Y	Y	
	Corner Azimuth	CAZM	Y	Y	
	Corner Distance	CDIS	Y	Y	
	Right Azimuth	RAZM	Y	Y	
	Percent Area	%ARE	Y	Y	

X Data required
Y Data required if multiple conditions occur on subplot
ME ME only
* Remeasurement plot only

			Sub 1 - 4 (Trees >= 5.0")											
		PAST >>	*Null*	*Null*	*1*	*2*	*1*	*2*	*NT*	*1*	*2*	*NT*	*1*	*2*
		TRST >>	1	2	0		1			2			3	
	Data Element	***PDR Prompt***	***Data Required***											
Tree Data	Tree Number	TR#	X	X	D	D	D	D	X	D	D	X	D	D
	Condition Number	COND#	X	X	X	X	X	X	X	X	X	X	X	X
	Azimuth	AZM	X	X	D	D	D	D	X	D	D	X	D	D
	Horizontal Distance	DIST	X	X	D	D	D	D	X	D	D	X	D	D
	Previous Tree Status	PAST			X	X	X	X		X	X		X	X
	Present Tree Status	TRST	X	X	X	X	X	X	X	X	X	X	X	X
	Reconcile	RECO			X	X			X			X		
	Standing Dead	DEAD		X						X	X	X		
	Species	SPP	X	X	D	D	D	D	X	D	D	X	D	D
	Previous Diameter at Breast Height	DBHO			D	D	D	D		D	D		D	D
	Diameter at Breast Height	DBH	X	X			X	X	X	X	X	X		
	Diameter Check	DCHE					X	X	X	X	X	X		
	Tree Class	TCC	X	X			X	X	X	X	X	X		
	Tree Grade	TRGD	G				G		G					
	Saw Length	*SAW*	S^e	S^e			S^e	S^e	S^e	S^e	S^e	S^e		
	Board-foot Rough Cull	*BRGH*	S^e	S^e			S^e	S^e	S^e	S^e	S^e	S^e		
	Board-foot Rotten Cull	*BROT*	S^e	S^e			S^e	S^e	S^e	S^e	S^e	S^e		
	Bole Length	*BOLE*	B^e	B^e			B^e	B^e	B^e	B^e	B^e	B^e		
	Cubic-foot Rough Cull	CRGH	B^e	B^e			B^e	B^e	B^e	B^e	B^e	B^e		
	Cubic-foot Rotten Cull	ROTT	L/B^e	L/B^e			L/B^e	L/B^e	L/B^e	L/B^e	L/B^e	L/B^e		
	Total Length	THGT	L				L		L					
	Actual Length	ACTU	X	X			X	X	X	X	X	X		
	Length Method	METH	L				L		L					
	Crown Class	CCC	L				L		L					
	Compact Crown Ratio	CRC	L				L		L					
	P3 Crown Variables	P3CRN	P				P	P	P					
	Damage Agents Standard 1 and 2	DAM1,2	X				X		X					
	Cause of Death	CAUS								X		X	X	X
	Decay Class	DEC		X						X	X	X		
	Length to Diameter Measurement Point	DIAH	X	X			X	X	X	X	X	X		
	Boughs Available	BAVA	F				F	F	F					
	Boughs Harvested	BHAR	F				F	F	F					
	Boughs Harvesting Guidelines	GUID	F				F	F	F					

Null Subplot previously not installed.
NT Tree not tallied last cycle
D Downloaded
X Data required
G If TCC = 2 and sawtimber size
S^e If TCC = 2 or 5 and sawtimber size, eastern crews only
B^e If TCC = 2, 3, 4 or 5, eastern crews only
L/B^e Live tees, western crews only / If TCC = 2, 3, 4 or 5, eastern crews only
L Live trees only
F If species = 0012, MN only
P P3 only
(shaded) Tree variables for remeasured trees now on nonforest land (PAST = 1 or 2 and TRST = 0, 1, 2 or 3).

			Micro 1 - 4 (Trees >= 1.0" to < 5.0")					
		PAST >>	*Null*	*1*	*1*	*NT*	*1*	*1*
		TRST >>	**1**	**0**	**1**		**2**	**3**
Sapling Data	***Data Element***	***PDR Prompt***	***Data Required***					
	Tree Number	TR#	X	D	D	X	D	D
	Condition Class Number	COND#	X	X	X	X	X	X
	Azimuth	AZM	X	D	D	X	D	D
	Horizontal Distance	DIST	X	D	D	X	D	D
	Previous Tree Status	PAST		D	D		D	D
	Present Tree Status	TRST	X	X	X	X	X	X
	Reconcile	RECO		X		X		
	Species	SPP	X	D	D	X	D	D
	Previous Diameter at Breast Height	DBHO		D	D		D	D
	Diameter at Breast Height	DBH	X		X	X		
	Diameter Check	DCHE			X	X		
	Total Length	THGT	P		P	P		
	Actual Length	ACTU	P/ME		P/ME	P/ME		
	Length Method	METH	P/ME		P/ME	P/ME		
	Crown Class	CCC	X		X	X		
	Compact Crown Ratio	CRC	X		X	X		
	P3 Crown Variables	P3CRN	P		P	P		
	Cause of Death	CAUS					X	X
	Length to Diameter Measuerment Point	DIAH	X		X	X		

Null Microplot previously not installed
NT Tree not tallied last cycle
D Downloaded
X Data required
F If species = 0012, MN only
P P3 only
ME ME only
Tree variables for remeasured saplings now on nonforest land (PAST = 1 and TRST = 0, 1, 2 or 3).

			Tree	**Sap**
P3 Crown Variables	***Data Element***	***PDR Prompt***	***Data Required***	
	Uncompacted Crown Ratio	UCRC	X	X
	Crown Light Exposure	CRLE	X	X
	Crown Position	CRPO	X	X
	Crown Vigor Class	CRVC		X
	Crown Density	CRDN	X	
	Crown Dieback	CRDB	X	
	Transparency	CRTR	X	

X Data required on all live P3 trees and saplings.

Seed	***Data Element***	***PDR Prompt***	***DR***
	Species	SPP	X
	Condition Class Number	CON#	X
	Seedling Count	SED#	X

X Data required if microplot has accessible forest land

ALTERNATE TREE TALLY GUIDE BY KEY VARIABLES: TRST, DEAD AND TCC

nfrm	x	x	x	x	x	x	x	x	x	x	x		x																					
NRS P2 Tree Data Element	**Subplot # (REM download)**	**Tree # (REM download)**	**Species (REM download)**	**Azimuth (REM download)**	**H. Distance (REM download)**	**Prev. Tree Status (REM download)**	**Prev. DBH (REM download)**	Present Tree Status	Reconcile (REM plots only)	Standing Dead (PAST = 1 or 2 only)	Cause of Death (PAST = 1 only; or TRST = 2 & RECO = 1 - 3)	Decay Class	Condition #	Diameter at Breast Height	Diameter Check	Length to Diameter Point	*Tree Class*	*Tree Grade (TCC = 2 only)*	*Saw Length (TCC = 2 or 5, East only)*	*BF Rough Cull (TCC = 2 or 5, East only)*	*BF Rotten Cull (TCC = 2 or 5, East only)*	*Bole Length (East only)*	CF Rough Cull	CF Rotten Cull	Total Length	Actual Length	Length Method	Crown Class	Compact Crown Ratio	*Damage Agents Standard 1*	*Damage Agents Standard 2*	*Boughs Available (MN only)*	*Boughs Harvested (MN only)*	*Boughs Harvest. Guidelines (MN only)*
	x	**xxx**	**xxxx**	**xxx**	**xxx**	**x**	**xxx**	x	x	x	xx	x	x	xxx	x	xx	x	x	xx	xx	xx	xx	xx	xx	xxx	xxx	x	x	xx	xxx	xxx	x	x	x
Prompt	**SUB#**	**TR#**	**SPP**	**AZM**	**DIST**	**PAST**	**DBHO**	TRST	RECO	DEAD	CAUS	DEC	CON#	DBH	DCHE	DIAH	TCC	TRGD	SAW	BRGH	BROT	BOLE	CRGH	ROTT	THGT	ACTU	METH	CCC	CRC	1DAM	2DAM	BAVA	BHAR	GUID
REM TREES	x	x	x	x	x	x	x	0	r				x																					
	x	x	x	x	x	x	x	1					x	x	x	x	2	s	s	s	s	x	x	x	x	x	x	x	x	x	x	f	f	f
	x	x	x	x	x	x	x	1					x	x	x	x	3					x	x	x	x	x	x	x	x	x	x	f	f	f
	x	x	x	x	x	x	x	1					x	x	x	x	4					x	x	x	x	x	x	x	x	x	x	f	f	f
	x	x	x	x	x	x	x	2		1	x	x	x	x	x	x	5		s	s	s	x	x	x		x								
	x	x	x	x	x	x	x	2		1	x	x	x	x	x	x	6									x								
	x	x	x	x	x	x	x	2		0	x		x																					
	x	x	x	x	x	x	x	3			x		x																					
NEW TREES	x	x	x	x	x			1	r				x	x	x	x	2	s	s	s	s	x	x	x	x	x	x	x	x	x	x	f	f	f
	x	x	x	x	x			1	r				x	x	x	x	3					x	x	x	x	x	x	x	x	x	x	f	f	f
	x	x	x	x	x			1	r				x	x	x	x	4					x	x	x	x	x	x	x	x	x	x	f	f	f
	x	x	x	x	x			2	r	x	r	x	x	x	x	x	5		s	s	s	x	x	x		x								
	x	x	x	x	x			2	r	x	r	x	x	x	x	x	6									x								

nfrm	forest to nonforest remeasure variables
x	required
r	remeasuement plot only
s	sawtimber only
f	balsam fir only, MN

ALTERNATE SAPLING TALLY GUIDE BY KEY VARIABLES: TRST, DEAD AND TCC

nfrm	x	x	x	x	x	x	x	x	x		x		x																					
NRS P2 Tree Data Element	**Subplot # (REM download)**	**Tree # (REM download)**	**Species (REM download)**	**Azimuth (REM download)**	**H. Distance (REM download)**	**Prev. Tree Status (REM download)**	**Prev. DBH (REM download)**	Present Tree Status	Reconcile (REM plots only)	Standing Dead (PAST = 1 or 2 only)	Cause of Death (PAST = 1 only; or TRST = 2 & RECO = 1 - 3)	Decay Class	Condition #	Diameter at Breast Height	Diameter Check	Length to Diameter Point	*Tree Class*	*Tree Grade (TCC = 2 only)*	*Saw Length (TCC = 2 or 5, East only)*	*BF Rough Cull (TCC = 2 or 5, East only)*	*BF Rotten Cull (TCC = 2 or 5, East only)*	*Bole Length (East only)*	CF Rough Cull	CF Rotten Cull	Total Length	Actual Length	Length Method	Crown Class	Compact Crown Ratio	*Damage Agents Standard 1*	*Damage Agents Standard 2*	*Boughs Available (MN only)*	*Boughs Harvested (MN only)*	*Boughs Harvest. Guidelines (MN only)*
	x	**xxx**	**xxxx**	**xxx**	**xxx**	**x**	**xxx**	x	x	x	xx	x	x	xxx	x	xx	x	x	xx	xx	xx	xx	xx	xx	xxx	xxx	x	x	xx	xxx	xxx	x	x	x
Prompt	**SUB#**	**TR#**	**SPP**	**AZM**	**DIST**	**PAST**	**DBHO**	TRST	RECO	DEAD	CAUS	DEC	CON#	DBH	DCHE	DIAH	TCC	TRGD	SAW	BRGH	BROT	BOLE	CRGH	ROTT	THGT	ACTU	METH	CCC	CRC	1DAM	2DAM	BAVA	BHAR	GUID
REM SAPS	x	x	x	x	x	x	x	0	r				x																					
	x	x	x	x	x	x	x	1					x	x	x	x										m	m	x	x			f	f	f
	x	x	x	x	x	x	x	2			x		x																					
	x	x	x	x	x	x	x	3			x		x																					
NEW	x	x	x	x	x			1	r				x	x	x	x										m	m	x	x			f	f	f

nfrm	forest to nonforest remeasure variables
x	required
r	remeasuement plot only
m	ME only
f	balsam fir only, MN

Regional Appendix J. Cycle and Subcyle Chart, PDR Prompts, and PDR Prompt Index

FY 2011 State	FPIS	Cycle	SubCycle	FY 2012 State	FPIS	Cycle	SubCycle
Connecticut	9	6	4	Connecticut	9	6	5
Delaware	10	6	3	Delaware	10	6	4
Illinois	17	7	1	Illinois	17	7	2
Indiana	18	7	3	Indiana	18	7	4
Iowa	19	6	3	Iowa	19	6	4
Kansas	20	7	1	Kansas	20	7	2
Maine	23	7	3	Maine	23	7	4
Maryland	24	7	3	Maryland	24	7	4
Massachusetts	25	6	4	Massachusetts	25	6	5
Michigan	26	8	2	Michigan	26	8	3
Minnesota	27	14	3	Minnesota	27	14	4
Missouri	29	7	3	Missouri	29	7	4
Nebraska	31	6	1	Nebraska	31	6	2
New Hampshire	33	7	4	New Hampshire	33	7	5
New Jersey	34	6	3	New Jersey	34	6	4
New York	36	6	4	New York	36	6	5
North Dakota	38	6	1	North Dakota	38	6	2
Ohio	39	6	5	Ohio	39	7	1
Pennsylvania	42	7	2	Pennsylvania	42	7	3
Rhode Island	44	6	4	Rhode Island	44	6	5
South Dakota	46	7	1	South Dakota	46	7	2
Vermont	50	7	4	Vermont	50	7	5
West Virginia	54	7	3	West Virginia	54	7	4
Wisconsin	55	8	2	Wisconsin	55	8	3

Allegro Hot Keys

Menu and Subplot # Navigation:
F1 Help
F2 Next Menu
F3 Previous Menu
F4 Main Menu
F5 Functions

CTRL/ALT + 1 Subplot 1 (Simultaneous CTRL on Allegro does not work)
CTRL/ALT + 2 Subplot 2 (Simultaneous CTRL on Allegro does not work)
CTRL/ALT + 3 Subplot 3 (Simultaneous CTRL on Allegro does not work)
CTRL/ALT + 4 Subplot 4 (Simultaneous CTRL on Allegro does not work)

Data Entry Functions:
Tab Left Previous Record (only on Allegro)
Tab Right Next Record/New Record (only on Allegro)

BkSp Delete Entered Text
ESC Exit edit mode and restore previously entered value

Blue+BkSP Toggle between Touchscreen Off and On

Grid Only Operations:
CTRL + Down Arrow Next Record/New Record
CTRL + Right Arrow Toggle between Autojump Right (R) and Autojump Down (D)

PageUp Scroll up through records a page at a time
PageDown Scroll down through records a page at a time

Blue+Right Arrow Scroll to the right ignoring conditional shading (only on Allegro)
Blue+Left Arrow Scroll to the left ignoring conditional shading (only on Allegro)

Alphabetic Hotkeys:
CTRL/ALT + A Data Entry Options
CTRL/ALT + B Jump to middle of data fields (for screens with large amounts of data)

CTRL/ALT + F First Record
CTRL/ALT + L Last Record
CTRL/ALT + G Goto Record

CTRL/ALT + C Next Tree Number

CTRL/ALT + D Toggle between single record and grid data entry

CTRL/ALT + H Home

CTRL/ALT + I Select Subplot (Simultaneous CTRL on Allegro does not work)
CTRL/ALT + O Previous Subplot
CTRL/ALT + U Next Subplot

CTRL/ALT + S Save Plot

CTRL/ALT + M Get Slope Correction (Simultaneous CTRL on Allegro does not work)

Continued on Next Page

CTRL/ALT + P Diameter Root Collar

CTRL/ALT + N Note
CTRL/ALT + W Edit Current Record
CTRL/ALT + X Edit Current Menu

CTRL/ALT + K Read in GPS File Exchange Folder Coordinates
CTRL/ALT + Q Sort Trees Ascending Azimuths, Trees then Saplings

PDR PROMPT INDEX

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