

## **4.000 CONDITION CLASS, BOUNDARY AND SUBPLOT DATA**

### **CONDITION CLASS**

The Forest Inventory and Analysis (FIA) plot is cluster of four subplots in a fixed pattern. Subplots are never reconfigured or moved in order to confine them to a single condition, or 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). Delineation and mapping of condition classes is a major departure from past inventory practices, and is intended to allow flexible post stratification of data for a variety of purposes.

### **DETERMINATION OF CONDITION CLASS**

#### **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 into condition classes based upon the following differences in **CONDITION CLASS STATUS**:

- Accessible forest land
- Nonforest land
- Noncensus water
- Census water
- Denied access area
- Area too hazardous to visit
- Area that is not in the sample, e.g., in Canada or Mexico.

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

#### **Step 2: Further subdivide Accessible Forest Land by seven 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 within the sampled area in any of the following attributes:

- Land Use Class (Northeast Regional Variable)
- Forest Type
- Stand Size Class
- Regeneration Status
- Reserved Status
- Tree Density
- Owner Group

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 4.400 to 4.470).

### 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:

*Attributes where a change causes a separate condition class*

- 4.320 Land Use Class (Northeast Regional Variable)
- 4.330 Forest Type
- 4.340 Stand Size
- 4.350 Regeneration Status
- 4.360 Reserved Status
- 4.370 Tree Density
- 4.380 Owner Group

*Ancillary – changes do not delineate a new condition class*

- 4.400 Owner Class
- 4.405 Private Owner Industrial Status
- 4.410 Artificial Regeneration Species
- 4.420 Stand age
- 4.431 Disturbance (up to 3 coded)
- 4.432 Disturbance Year (1 per disturbance)
- 4.491 Treatment (up to 3 coded)
- 4.492 Treatment Year (1 per treatment)
- 4.440 Physiographic Class
- 4.450 Timber Management Class (Northeast Regional Variable)
- 4.460 Stand History (Northeast Regional Variable)
- 4.465 Stand Structure (Northeast Regional Variable)
- 4.470 Stocking Class (Northeast Regional Variable)

When classifying CONDITION CLASS STATUS, OWNER GROUP, and RESERVED STATUS, base the classification on what is present within the area defined by the fixed radius plot (annular, subplot, or microplot). When classifying all other condition class variables, base the classification on the annular plot (i.e., avoid micro site classifications within the condition class).

Specific instructions for the classification of each attribute follow.

**4.300 CONDITION CLASS NUMBER** -- On a plot, assign and record a unique identifying number for each condition class. At the time of the plot establishment, the condition class at plot center (the center of subplot 1) is designated condition class number 1. Other condition classes are assigned numbers sequentially from subplot center at the time each condition class is delineated. On a plot, each sampled condition class must have a unique number that can change at remeasurement to reflect new conditions on the plot. See example on how to record multiple condition classes at the end of chapter 4.

When collected: All condition classes

Field width: 1 digit

Tolerance: No errors

MQO: At least 99% of the time

Values: 1 to 9

### **CONDITION CLASS DEFINING (DELINEATION) VARIABLES**

**4.310 CONDITION CLASS STATUS** -- Record the code that describes the status of the condition. Record for all condition classes sampled on a plot. The instructions beginning on page 39 (“Determination of Condition Class”) and the instructions starting on the next page (“Delineating Condition Classes Differing in Condition Class Status”) apply when delineating condition classes that differ by CONDITION CLASS STATUS.

When collected: All condition classes

Field width: 1 digit

Tolerance: No errors

MQO: At least 99% of the time

Values:

- 1 Accessible forest land
- 2 Nonforest land
- 3 Noncensus water
- 4 Census water
- 5 Denied access area
- 6 Area too hazardous to visit
- 7 Area that is not in the sample, e.g., in Canada or Mexico.

## 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 ac in size, and each is at least 120.0 ft in width. These size and width minimums apply to both accessible forest land and nonforest land.

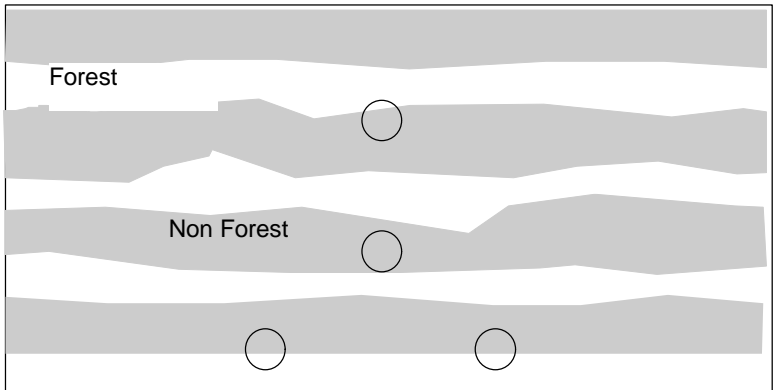
Within an accessible forest land condition class, unimproved roads, rock outcrops, and natural nonforest openings less than 1.0 ac in size and less than 120.0 ft in width are considered forest land and are not delineated and classified as a separate nonforest condition class.

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

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

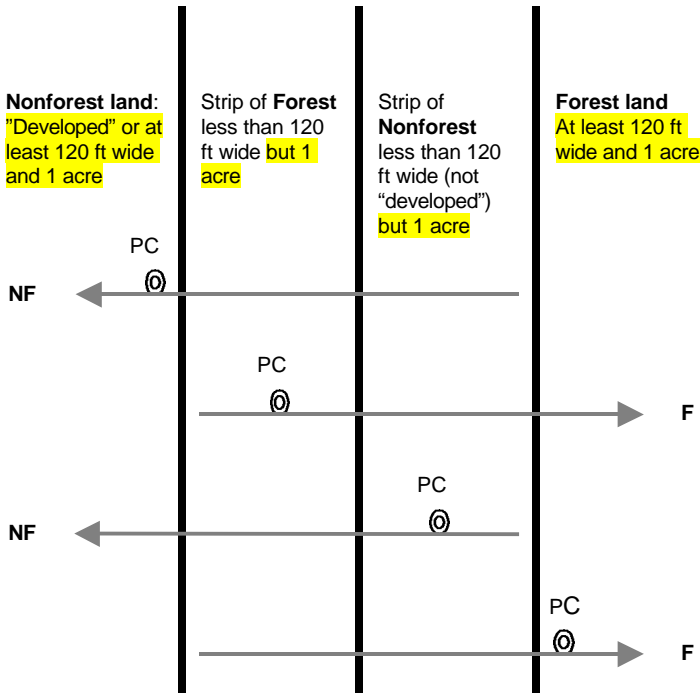
1. “Developed” nonforest conditions: human-caused nonforest land condition classes such as homes or cabins that are less than 1.0 ac in size and 120.0 ft in width and are surrounded by forest land. All extensions from developed nonforest inclusions are nonforest condition classes regardless of length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

2. Distinct, alternating strips of forest and nonforest land (other than the “developed” nonforest conditions as described in the previous paragraphs): this situation occurs when a plot or subplot samples a condition class that is less than 1.0 ac in size and less than 120.0 ft. 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.
  - a) For many small, intermingled strips, determine the total area that the alternating strips occupy, and classify according to the CONDITION CLASS STATUS (forest land or nonforest land) that occupies the greater area, see Regional Figure 2a. If the area of alternating strips is so large or indistinct as to make a total area determination impractical, then classify the sample as forest land.



**Figure 2a.** 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. The entire area is classified as nonforest since the sum of the areas occupied by the nonforest land use exceeds the sum of the forested area in this example.

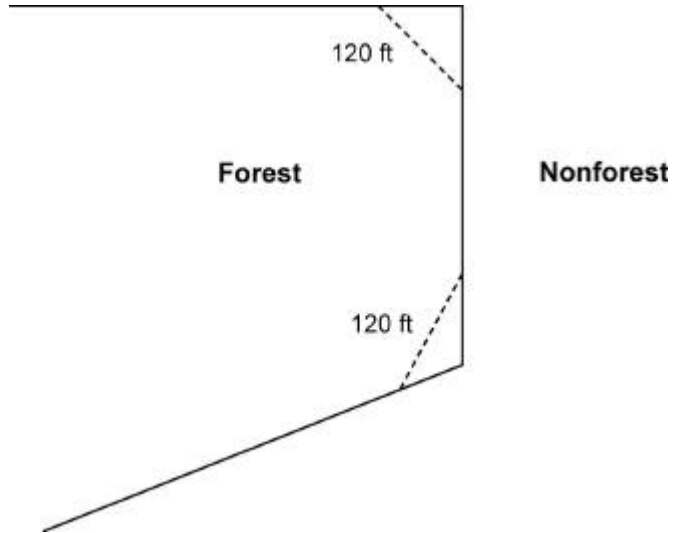
- b) For two alternating strips of forest and nonforest (again not a “developed” nonforest condition) between two qualifying areas of nonforest land and forest land, uses the following rule. Plot center of subplot 1 determines if the two alternating strips are classified as forest or nonforest, see Figure 2. Any subplot that then falls in the alternating strips uses the rule established by the plot center at subplot 1. Any portion of a subplot that falls in the qualifying nonforest / forest is classified that type.



**Figure 2. Example of alternating strips of forested and nonforested conditions. Note: PC represents the plot center at subplot 1.**

See additional examples in Appendix 5 beginning on page 234 relating to the above figure.

3. The 120 ft minimum width for delineation does not apply when a corner angle is  $90^\circ$  or greater (Figure 3). **Note: If the interior corner angle is less than  $90^\circ$  go to page 45 and 46.**



**Figure 3. Illustration of the  $90^\circ$  corner rule. The dotted lines do not create nonforest 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 ft wide and cover at least 1.0 ac. 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 ac requirement; use professional judgment and common sense on any linear water feature.
5. Hazardous or denied access conditions within accessible forest land are delineated, regardless of size, as a separate condition.

## CONDITION CLASS STATUS DEFINITIONS

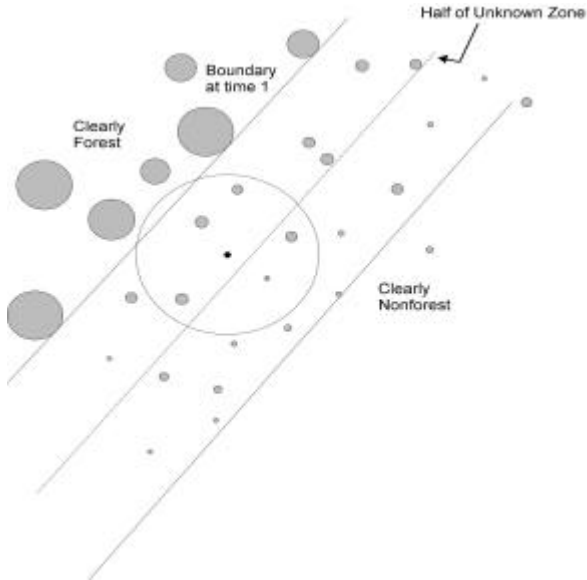
### **ACCESSIBLE FOREST LAND – Code 1**

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 the following criteria:

**The condition is at least 10-percent stocked by trees of any size (Appendix 6) 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.

**To qualify as forest land, the prospective condition must be at least 1.0 ac in size and 120.0 ft wide measured stem-to-stem.** Forested strips must be 120.0 ft wide for a continuous length of at least 363.0 ft 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 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% minimum forest land stocking, and where it clearly is less than required stocking; divide the zone between these points in half, and determine the side of the zone on which the subplot center is located. Classify the condition class of the subplot based on this line (Figure 4).



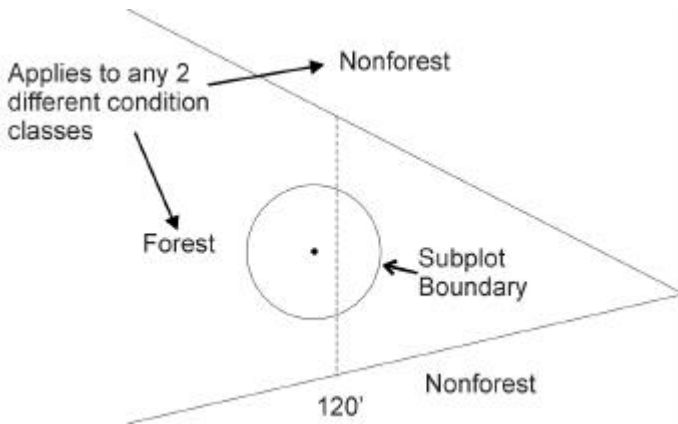
**Figure 4. Example of classifying the condition class of the subplot in a transition zone with forest/nonforest encroachment.**

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 is clearly stocked where it meets the nonforest, classify the entire zone as forest. If the zone is clearly nonforest up to the original stand, call it all nonforest. If the encroachment or transition zone is not clearly stocked where it meets the nonforest, determine where it is clearly stocked (forest) and where it is clearly not stocked (nonforest); divide this zone in half, and classify the entire subplot based on which side of the line the subplot center falls.

Treated strips – Occasionally, crews will come across plantations of trees, in which rows of trees alternate with strips of vegetation that have been bulldozed, mowed, tilled, treated with herbicide, or crushed. Because these strip treatments are conducted to optimize growth or to release the stand, the areas are considered forest land, and the

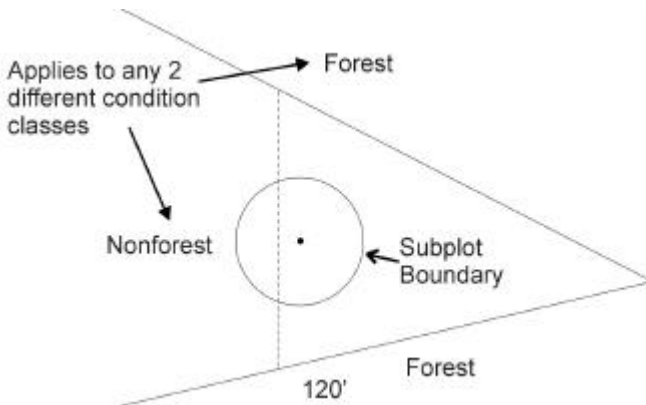
treatment is considered a timber stand improvement operation. Do not confuse these practices with similar treatments on nonforest lands such as yards or rights-of-way. Contact with the land owner may help determine the intent of a treatment.

Indistinct boundary due to the condition minimum-width definition -- Do not subdivide subplots where a condition class may change due only to the forest vs. nonforest minimum width (120.0 ft) 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 5 and 6. 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 5. Forest condition narrows within a nonforest condition. Examine the location of the subplot center in reference to the approximate line where the forest narrows to 120 ft wide. In this example, the entire subplot is classified as forest.**

On page 281 in Appendix 10, a table is included to assist in determining when the width across an interior corner angle becomes 120 ft wide.



**Figure 6. Nonforest 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 ft wide. In this example, the entire subplot is classified as forest.**

#### **NONFOREST LAND – Code 2**

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 codes 3 through 7. To qualify, the area must be at least 1.0 ac in size and 120.0 ft wide, with 5 exceptions discussed previously beginning on page 42. **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 occasion to see if it has become forest land.

#### **NONCENSUS WATER – Code 3**

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

#### **CENSUS WATER – Code 4**

Lakes, reservoirs, ponds, and similar bodies of water 4.5 ac in size and larger; and rivers, streams, canals, etc., more than 200 ft wide (1990 U.S. Census definition). **(Refer to Appendix 5, Specific Tally Procedures.)**

**DENIED ACCESS – Code 5**

Any area within the sampled area on a plot on which access is denied by the legal owner of the land the plot falls on, or by an owner of the only reasonable route to the plot. **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.

**HAZARDOUS – Code 6**

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 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.**

**NOT IN THE SAMPLE – Code 7**

Any area within the sampled area on a plot that is not within the boundaries of the sample population of interest. Examples of areas out of the sample would be plots or portions of plots falling in Mexico or Canada. A condition outside the sample area remains in the potential population of interest and is re-examined at the next occasion to determine if it becomes part of the population of interest. **There are no minimum size or width requirements for a condition class delineated as out of the sample.**

DELINEATING CONDITION CLASSES WITHIN ACCESSIBLE FOREST LAND

Accessible forest land is subdivided into condition classes that are based on differences in LAND USE, FOREST TYPE, STAND SIZE CLASS, REGENERATION STATUS, RESERVED STATUS, TREE DENSITY, and OWNER GROUP. “Determination of Condition Class” applies when delineating contrasting forest condition classes. Specific criteria apply for each of the seven attributes, and are documented by attribute in subsections 4.320 to 4.380. “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 ac in size and at least 120.0 ft 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. For each condition class recognized, there are many “ancillary attributes” that help describe the condition will be collected, but will not be used for delineation purposes (see sections 4.400 to 4.470).

General instructions for delineating condition classes within accessible forest land:

1. Distinct boundary within an annular plot (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 page 86.
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 seedling-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 ft wide, and 1.0 ac or more in size, cumulative, but not necessarily present on both sides of and adjacent to 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, beaver ponds, sink holes, cypress domes and ponds, man-made ditches and canals. A riparian forest area must be associated “within forest” and contain at least one distinct and obvious change in a condition class delineation attribute from its adjacent accessible forest land condition class.

NOTE: When the width of forest adjacent to a stream is between 120 ft and 150 ft and the width of the riparian forest is at least 30 ft wide, the rules for identifying the non-riparian forest (at least 30 ft but less than 120 ft) need to be modified. The non-riparian forest can be between 30 ft and 120 ft 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.

**4.320 LAND USE CLASS** – This is a Northeast regional variable used to further subdivide accessible forest land and nonforest land. Assign a current land use class for each condition class that occurs on the subplot. To qualify as a separate land use, the area in question must meet the guidelines as described in “Delineating Condition Classes Differing in Condition Class Status” (see page 42 – 45).

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**Field crews are required to notify a supervisor of all plots that are assigned a Land Use Class that differs from the Previous Land Use Class within one week of the date that the plot was completed.**

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The following land use definitions and codes contain new definitions and codes that are used to describe *Other Forest Land and Christmas Tree Plantations*. The concept of *Other Forest Land* is a significant departure from the way land use has previously been classified by FIA at the Northeastern Research Station. All field employees are advised to read this section carefully, and to ask questions if there are any concerns. It is your obligation to understand these instructions and apply them consistently.

When collected: CONDITION CLASS STATUS 1, 2, 3 and 4  
Field width: 2 digits  
Tolerance: No errors  
MQO: At least 99% of the time  
Values: Codes listed on pages 53 - 59

**FOREST LAND** -- Land that meets the definition of accessible forest land as described on pages 46 - 49. Grazed woodlands, reverting fields, and pastures that are not actively maintained are included if the definition of accessible forest land is met.

**Following are the forest land use definitions and codes. Use these codes in conjunction with CONDITION CLASS STATUS 1.**

**TIMBERLAND** -- Code 20

Forest land that is producing or capable of producing crops of industrial wood in excess of 20 cubic feet per acre per year, **and** is not withdrawn from timber utilization by statute or administrative designation. (Land withdrawn from timber utilization must be publicly owned land. See the definitions of Reserved, Unproductive Reserved, and Reserved Other Forest land.)

NOTE: Timberland may be nonstocked provided that neither any natural condition, nor any activity by humans, prevents or inhibits the establishment of tree seedlings.

### **OTHER FOREST LAND -- Code 30**

Forest land that is producing, or capable of producing, crops of industrial wood, but is associated with, or part of a nonforest land use. In the past, these areas would have been treated as inclusions in the nonforest land use because they were considered part of a development. Some examples of land that could be classified as other forest land are forested portions of city parks, forested land in highway medians and rights-of way, forested areas between ski runs, and forested areas within golf courses. Generally, although surrounded by nonforest development, these areas have not been developed themselves, and exhibit natural, undisturbed understories.

### **UNPRODUCTIVE OTHER FOREST LAND -- Code 31**

Other forest land that is incapable of producing 20 cubic feet per acre per year of industrial wood under natural conditions, because of adverse site conditions.

NOTE: 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 become established. **These conditions can be due to forces of nature or human-caused disturbances.**

### **RESERVED OTHER FOREST LAND -- Code 32**

Publicly owned other forest land, that is sufficiently productive to qualify as timberland, **and** is withdrawn from timber utilization by a public agency or by law.

### **UNPRODUCTIVE RESERVED OTHER FOREST LAND -- Code 33**

Publicly owned other forest land that is incapable of producing 20 cubic feet per acre per year of industrial wood under natural conditions, because of adverse site conditions, **and** is withdrawn from timber utilization by a public agency or by law.

NOTE: 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.**

**UNPRODUCTIVE FOREST LAND -- Code 40**

Forest land that is incapable of producing 20 cubic feet per acre per year of industrial wood under natural conditions, because of adverse site conditions.

NOTE: 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 become established. **These conditions can be due to forces of nature or human-caused disturbances.**

**UNPRODUCTIVE RESERVED FOREST LAND -- Code 41**

Publicly owned forest land that is incapable of producing 20 cubic feet per acre per year of industrial wood under natural conditions, because of adverse site conditions, **and** is withdrawn from timber utilization by a public agency or by law.

NOTE: 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.**

**RESERVED FOREST LAND – Code 50**

Publicly owned forest land that is sufficiently productive to qualify as timberland, but is withdrawn from timber utilization by a public agency or by law.

**CHRISTMAS TREE PLANTATIONS**

Historically, Christmas tree plantations were classified as forest land. However, **Christmas tree plantations are now classified as nonforest land.** (See nonforest land use codes 87 and 88.)

**URBAN FOREST LAND -- Code 52**

Land that, except for its location, would ordinarily be classified as timberland. This land is either nearly (surrounded on three sides), or completely, surrounded by urban development, whether commercial, industrial or residential. This land meets all of the criteria for timberland, that is, at least one acre; capable of producing at least 20 cubic feet per acre per year of industrial wood; is not developed for some use other than timber production; is not reserved by a public agency. It is extremely unlikely that such land would be used for

timber products on a continuing basis. Such land may be held for future development, or scheduled for development. (The timber that is present may be utilized only at the time of development.) The land may be undeveloped due to periodic flooding, low wet sites, steep slopes, or their proximity to industrial facilities that are unfavorable to residential development.

Forested areas within city parks are not urban forest land. They may be *Other Forest Land* if the requirements for *Other Forest Land* are met, otherwise, they would be nonforest land. City Parks cannot be classified as Urban Forest Land as it is currently defined.

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**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 (see Nonforest Land definition on page 49). Although there may be some stocking, the critical classification factor is the predominant use being made of the land. ***Do not confuse with urban forest land.***

**NONFOREST LAND WITH TREES** -- This is a land use on which trees 5 inches DBH and larger are present within the "plot triangle," but the predominant use is other than forest land. The plot triangle is formed by the 3 outer subplots and is used in photo interpretation to determine whether or not a plot is classified with or without trees. If there are multiple conditions on plot, assess only the portion of the plot triangle that occupies the condition. See Figure A and B.

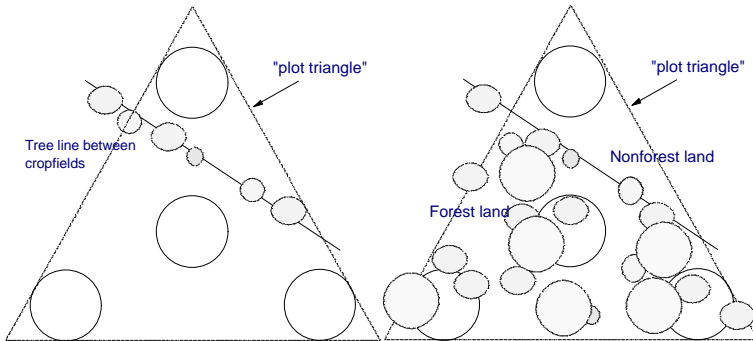


Figure A. Entire plot is classified as nonforest land with trees.

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

**Following are the nonforest land use definitions and codes. Use these codes in conjunction with **CONDITION CLASS STATUS 2.****

**Enter odd numbered codes for nonforest land uses without trees and the even numbered codes for nonforest land with trees.**

**CROPLAND** -- without trees Code **61** with trees Code **62**

Land that currently supports agricultural crops including silage and feed grains, bare farm fields resulting from cultivation or harvest, and maintained orchards and nurseries.

**IMPROVED / MAINTAINED PASTURE** – without trees Code **63** with trees Code **64**

Land maintained and used and for grazing (not including grazed cropland). Evidence of maintenance, besides the degree of grazing, includes condition of fencing, presence of stock ponds, periodic brush removal, seeding, or mowing. Land that generally has less than 10 percent stocking in live trees (established seedlings or larger trees), except that occasional large trees with the obvious function of providing shade for livestock, and small single trees or clusters of hawthorn or eastern redcedar should be ignored when determining stocking. Grazing should be so intense that forest reproduction (except for hawthorn and eastern redcedar) could not occur naturally -- this would be evident if all other vegetation were closely browsed.

**IDLE FARMLAND** -- without trees Code **65** with trees Code **66**

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

**OTHER FARMLAND** -- without trees Code **67** with trees Code **68**

Other farmland is all nonforest land on a farm excluding cropland, pasture, and idle farmland. It includes farm lanes, stock pens, and farmsteads. Specify the specific land use in the General Notes

**BOG (nonforest)** -- Code **69**

Wet, spongy land characteristically having a thick layer of peat. It is rich in plant residues, usually acidic, and frequently surrounds a body of open water. Characteristic florae are sedges, heaths, and sphagnum.

NOTE: 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. (LU 20 or 40).

**MARSH -- Code 70**

A tract of soft wet land, often periodically inundated and always treeless. It is usually characterized by grasses, cattails or other monocotyledons (i.e., lilies, lady slippers, sedges).

**SALT MARSH -- Code 71**

Flat land that is subject to intermittent or occasional overflow by salt water, containing water that is brackish to strongly saline. A salt marsh supports saltwater adapted plants that usually consist chiefly of grasses.

**SWAMP (nonforest) -- Code 72**

Wet, spongy land saturated and sometimes partially or intermittently covered with water. Such land supports natural vegetation predominantly of shrubs, and/or trees.

NOTE: 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. (LU 20 or 40)

**RIGHTS - of - WAY -- without trees Code 73 with trees Code 74**

Highways, railroads, airports, pipelines, power lines, canals

**MINING and WASTE LAND -- without trees Code 75 with trees Code 76**

Surface mining, gravel pits, dumps, landfills, reclaimed mining areas

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 crews 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.

**DEVELOPED RECREATION SITE** -- without trees Code **77** with trees Code **78**

Parks, campgrounds, playing fields, athletic and sports tracks.

**INDUSTRIAL / COMMERCIAL LAND** -- without trees Code **79** with trees Code **80**

Supply yards, parking lots, shopping centers, factories, etc.

**MULTIPLE FAMILY HOUSING** -- without trees Code **81** with trees Code **82**

More than one family household per structure, for example, condominiums, townhouses, row houses and apartment buildings.

**SINGLE FAMILY HOUSING** -- without trees Code **83** with trees Code **84**

One family or person per structure

**OTHER NONFOREST** -- without trees Code **85** with trees Code **86**

Includes any category of nonforest land use not mentioned previously. Describe each situation, in detail, in the General Notes section.

**CHRISTMAS TREE PLANTATIONS** -- without trees Code **87** with trees Code **88**

Active Christmas tree plantation must show signs of annual shearing. Record tree species used in the plantation in the General Notes section.

**Use the following codes in conjunction with CONDITION CLASS STATUS 3 and 4. (See definitions on page 49.)**

**CENSUS WATER** -- Code **91****NONCENSUS WATER** -- Code **92**

**4.330 FOREST TYPE** -- Record the code corresponding to the FOREST TYPE (see Appendix 2, Forest Type Algorithm) that best describes the species with the plurality of stocking for all live trees in the condition class that are not overtopped.

The instructions in “Determination of Condition Class” and “Delineating Condition Classes Differing in Condition Class Status” apply when

delineating, within accessible forest land, contrasting conditions based on differences in FOREST TYPE.

When collected: All accessible forest land condition classes

Field width: 3 digits

Tolerance: No errors in group; No errors in type

MQO: At least 99% of the time (group); At least 95% of the time (type)

Values:

### WHITE / RED / JACK PINE GROUP

- 101 Jack pine:** Associates -- red pine, northern pin oak, quaking and bigtooth aspen, paper birch, black spruce, and white spruce. Sites -- generally driest, most porous sands but also on more moist, sandy soils near swamps and on rocky hills and ledges.
- 102 Red pine:** Associates -- white, jack, or pitch pine; northern pin oak; white oak; red maple; paper birch; quaking and bigtooth aspen, chestnut oak, northern red oak, and hemlock. Sites -- spotty distribution in Northeast and sandy and gravelly locations or dry sandy loam soils; often in plantations.
- 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:** Associates -- beech, sugar maple, basswood, red maple, yellow birch, black cherry, white ash, paper birch, sweet birch, northern red oak, white oak, chestnut oak, yellow-poplar, and cucumber tree. Sites -- prefer cool locations, moist ravines, and north slopes.
- 105 Eastern hemlock:** Associates -- beech, sugar maple, yellow birch, basswood, red maple, black cherry, white ash, white pine, paper birch, sweet birch, northern red oak, white oak. Sites -- prefer cool locations, moist ravines, and north slopes.

### SPRUCE / FIR GROUP

- 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, balsam fir, quaking aspen, paper birch, jack pine, red spruce, sugar maple, beech, and yellow birch. Sites -- moist, sandy loam or alluvial soils-found on many different sites but especially typical of stream banks, lake shores, and adjacent slopes.
- 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. Use this code 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. Otherwise, code the plot as 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, balsam fir, jack pine, quaking aspen, paper birch, tamarack, northern white-cedar, black ash, or red maple. Sites -- acid peat swamps but also on moist flats and uplands.
- 126 Tamarack (eastern larch):** Associates -- northern white cedar, red maple, black ash, and quaking aspen. Sites -- wet swamps.
- 127 Northern white-cedar:** Associates -- tamarack, yellow birch, paper birch, black ash, red maple, white pine, and hemlock. Sites -- slow drainage (not stagnant bogs) areas that are not strongly acid.

#### LOBLOLLY AND SHORTLEAF PINE GROUP

- 161 Loblolly pine:** Associates -- sweetgum, southern red oak, post oak, blackjack oak, blackgum, yellow-poplar, and pond pine. Sites -- in Delaware and Maryland both on 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, 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.

#### PINYON / JUNIPER GROUP

- 181 Eastern 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.

#### DOUGLAS-FIR GROUP

- 201 Douglas-fir:** Sites – unmanaged or abandoned Christmas trees plantations in the Northeast.

#### EXOTIC SOFTWOODS GROUP

- 381 Scotch pine:** Plantation type, not naturally occurring.
- 383 Other exotic softwoods**
- 384 Norway spruce:** plantation type, not naturally occurring.
- 385 Larch (introduced):** plantation type, usually Japanese larch, European larch, or a hybrid of the two (Dunkeld larch) - not

naturally occurring. Sites -- well-drained uplands; numerous plantations in New York.

### OAK / PINE GROUP

- 401 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 on 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 oak / pine:** catchall type for other unnamed pine-hardwood combinations that meet the stocking requirements for oak-pine.

### OAK / HICKORY GROUP

- 501 Post oak / blackjack oak:** Associates -- northern pin oak, dwarf post oak, southern red oak, hickory, 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:** Associates -- scarlet oak, bur oak, pin oak, white ash, sugar maple, red maple, walnut, basswood, **black** 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, 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 occupy 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, cucumber tree, and other moist-site hardwoods (except sweetgum (see type 508) and white oak and northern red oak (see type 506). 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, 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.
- 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:** 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 -- white ash, hickory, white oak, Shumard 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 -- green ash, American elm, pecan, cottonwood, red maple, honeylocust, and persimmon. Sites -- very wet.

- 605 Overcup oak / water hickory:** Associates -- willow oak, American elm, green ash, hackberry, persimmon, and red maple. Sites -- in the 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:** Associates -- 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.
- 608 Sweetbay / swamp tupelo / red maple:** Associates -- blackgum, loblolly and pond pine, 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).

#### ELM / ASH / RED MAPLE GROUP

- 701 Black ash / American elm / red maple:** Associates -- silver maple, swamp white oak, 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 -- stream banks where bare, moist soil is available.
- 704 Willow:** Associates -- cottonwood, green ash, sycamore, pecan, American elm, red maple, and boxelder. Sites -- stream banks where bare, moist soil is available.
- 705 Sycamore / pecan / American elm:** Associates -- boxelder, green ash, hackberry, silver maple, cottonwood, willow, sweetgum, and river birch. Sites -- bottomlands, alluvial flood plains of major rivers.

- 706 Sugarberry / hackberry / American elm / green ash:** Associates -- pecan, blackgum, persimmon, honeylocust, red maple, hackberry, and boxelder. Sites -- low ridges and flats in flood plains.
- 707 Silver maple / American elm:** Associates: -- sweetgum, pin oak, swamp white oak, eastern cottonwood, sycamore, green ash, and other moist-site hardwoods. Sites -- well-drained moist sites along river bottoms and floodplains and beside lakes and larger streams. **This is a regional code.**
- 708 Red maple / lowlands:** Associates – white ash, green ash sycamore, American elm, willow and boxelder. Sites – moist to wet areas, swamps, gullies, and poorly drained flats.
- 709 Cottonwood / 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 -- 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:** Associates -- sugar maple, American beech, northern red oak, white oak, blackgum, hickory, cucumbertree, and yellow birch. Sites -- fertile, moist, well-drained sites.
- 805 Hard maple / basswood:** Associates -- 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:** Associates -- locust, silver maple, boxelder, elm, red maple, green ash predominate. **Found in East-Central United States.** Sites – upland. **Note: At time of publication, it was unknown if this type refers to honeylocust or black.**

**809 Red maple / uplands:** 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 man-made and may be the result of repeated cuttings. Sites -- uplands. (See Type 519 under oak/hickory group)

### ASPEN / BIRCH GROUP

**901 Aspen:** Associates -- paper birch, pin cherry, bur oak, green ash, American elm, balsam poplar, and boxelder. Sites -- all kinds of soils except driest sands and wettest swamps; found on burns, clear cuts, and abandoned land.

**902 Paper birch:** Associates -- aspen, white pine, yellow birch, hemlock, red maple, northern red oak, and basswood. Sites -- wide range of upland site, common on burns or clear cuts.

**903 Gray birch:** Associates -- oaks, red maple, white pine, and others. Sites -- poor soils of abandoned farms and burns. **This is a regional code.**

**904 Balsam poplar:** Associates – balsam fir, white spruce, black spruce, tamarack, aspen, and paper birch. Sites – uplands and flood plains.

### EXOTIC HARDWOODS GROUP

**991 Paulownia**

**995 Other exotic hardwoods**

**999 NONSTOCKED:** The site qualifies as forest, but is presently stocked with too few trees to assign a forest type.

**4.340 STAND-SIZE CLASS** -- Record the code that best describes the predominant size class of all live trees in the condition class that are not overtopped.

When collected: All accessible forest land condition classes

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 less than 10 percent stocked by trees of any size.
- 1  $\leq 4.9$  in (seedlings / saplings)** -- At least 10 percent stocking in trees of any size; and at least 2/3 of the crown cover is in trees less than 5.0 in DBH.
- 2 5.0 – 8.9 in (softwoods) / 5.0 – 10.9 in (hardwoods)** -- At least 10 percent stocking in trees of any size; and at least 1/3 of the crown cover is in trees greater than 5.0 in DBH **and** the plurality of the crown cover is in softwoods between 5.0 – 8.9 in diameter and/or hardwoods between 5.0 – 10.9 in DBH.
- 3 9.0 – 19.9 in (softwoods) / 11.0 – 19.9 in (hardwoods)** -- At least 10 percent stocking in trees of any size; and at least 1/3 of the crown cover is in trees greater than 5.0 in DBH **and** the plurality of the crown cover is in softwoods between 9.0 – 19.9 in diameter and/or hardwoods between 11.0 – 19.9 in DBH.
- 4 20.0 – 39.9 in** -- At least 10 percent stocking in trees of any size; and at least 1/3 of the crown cover is in trees greater than 5.0 in DBH **and** the plurality of the crown cover is in trees between 20.0 – 39.9 in DBH.
- 5 40.0 + in** -- At least 10 percent stocking in trees of any size and at least 1/3 of the crown cover is in trees greater than 5.0 in DBH **and** the plurality of the crown cover is in trees greater than 40.0 in DBH.

The instructions in “Determination of Condition Class” and “Delineating Condition Classes Differing in Condition Class Status” apply when delineating, on accessible forest land, contrasting conditions based on differences in STAND SIZE CLASS.

Within the sampled area on microplot, subplot, or annular plot, 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 large diameter stand from a small diameter stand. Use tree stocking of all live trees that are not overtopped to differentiate between stand-size classes.

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% of the crown cover in STAND SIZE CLASSES of 1, 2, 3, 4, and 5 or any combination of these STAND SIZE CLASSES; otherwise, the STAND SIZE CLASS is 0

depending on the characteristics of the stand. If at least 1/3 of crown cover is made up of STAND SIZE CLASSES = 2, 3, 4, and 5 (combined), the accessible forested condition will be classified in one of these STAND SIZE CLASSES based on which of these STAND SIZE CLASSES has the most crown cover. If less than 1/3 of the crown cover is made up of STAND SIZE CLASSES = 2, 3, 4, and 5 (combined), classify the accessible forested condition as a STAND SIZE CLASS = 1, if adequate cover is present.

**If no other condition class defining variables are different between accessible forest conditions, delineate on differences in STAND SIZE CLASS only for the following combinations:**

- Between Nonstocked (STAND SIZE CLASS = 0) and any stocked forest land (STAND SIZE CLASS = 1, 2, 3, 4, or 5)
- Between STAND SIZE CLASS = 1 and STAND SIZE CLASS = 3, 4, and 5
- Between STAND SIZE CLASS = 2 and STAND SIZE CLASS = 4 and 5
- Between STAND SIZE CLASS = 3 and STAND SIZE CLASS = 5.

NOTE: Differing stand size classes can be used to describe separate condition classes, while at the same time not be used to delineate separate condition classes. Example: Two adjacent forested stands of the same forest type, one with a STAND SIZE CLASS = 1 and the other with a STAND SIZE CLASS = 2 could be delineated as separated CONDITION CLASS if one of the other condition class delineation variables differs (based on the rules), i.e. OWNER GROUP differs between the two condition classes. In addition, the STAND SIZE CLASS variables for the two condition classes would be recorded and treated as an ANCILLARY variable.

**4.350 REGENERATION STATUS** -- Record the code that best describes the degree of evidence of artificial regeneration that occurred in the condition.

When collected: All accessible forest land condition classes

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 and recently cut lands. |
| 1 | Artificial | Present stand shows clear evidence of artificial regeneration.   |

The instructions in section “Determination of Condition Class” and “Delineating Condition Classes Differing in Condition Class Status” 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.

**REGENERATION STATUS** is the only delineating variable that does not require that at least 1 acre be affected by the coding elements. The presence of a single planted stem is sufficient to require the application of the *artificial* code. However, in order to map conditions solely on the basis of REGENERATION STATUS, you must have an area at least 1 acre in size and 120 feet in width that can be identified as a plantation, and the contrasting condition(s) must have no evidence of artificial regeneration whatsoever.

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

**4.360 RESERVE STATUS** -- Record the code that identifies the reserved designation for the condition. Reserved land is withdrawn by law(s) prohibiting the management of land for the production of wood products (not merely controlling or prohibiting wood harvesting methods). Such authority is vested in a public agency or department, and supersedes rights of ownership. The prohibition against management for wood products cannot be changed through decision of the land manager (management agency) or through a change in land management personnel, but rather is permanent in nature. The phrase "withdrawn by law" includes as reserved land, parcels of private land with deeds (tax office may have listing of owners) that specifically prohibit the management of the tract for the production of wood products.

When collected: All accessible forest land condition classes

Field width: 1 digit

Tolerance: No errors

MQO: At least 99% of the time

Values:

0 Not reserved

1 Reserved

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

The instructions in “Determination of Condition Class” and “Delineating Condition Classes Differing in Condition Class Status” 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 only as 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.

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

When collected: All accessible forest land condition classes

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 from 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. (I.e., Delineation by density should only be done when the less-dense condition is 50% or less as dense as the denser condition.)

Examples of valid contrasting conditions defined by differences in tree density are forest land conditions with the same type, origin, stand size, ownership, and reserved status, but:

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

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

When collected: All accessible forest land condition classes

Field width: 2 digits

Tolerance: No errors

MQO: At least 99% of the time

Values:

- |           |                            |
|-----------|----------------------------|
| <b>10</b> | Forest Service             |
| <b>20</b> | Other Federal              |
| <b>30</b> | State and Local Government |
| <b>40</b> | Private                    |

**ANCILLARY (NON-DELINEATING) VARIABLES**

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

When collected: All accessible forest land condition classes

Field width: 2 digits

Tolerance: No errors

MQO: At least 99% of the time

Values:

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

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

Owner Classes within Other Federal Lands (Owner Group 20)

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

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

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

Owner Classes within Private lands (Owner Group 40)

- 41 Corporate
- 42 Non Governmental Conservation / Natural Resources Organization
  - Examples: Nature Conservancy, National Trust for Private Lands, Pacific Forest Trust, Boy Scouts of America, etc.
- 43 Unincorporated Partnerships / Associations / Clubs
  - Examples: Hunting Clubs that **own, not lease** property, recreation associations, 4H, etc.

- 44** Native American (Indian) within reservation boundary  
**45** Individual

**4.405 PRIVATE OWNER INDUSTRIAL STATUS** -- Record the code identifying the status of the owner with regard to being considered industrial as determined by whether or not they own and operate a primary wood processing plant. A primary wood processing plant is any commercial operation that 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 below.

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

When collected: All accessible forest land condition classes 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

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

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

Field width: 3 digits

Tolerance: No errors

MQO: At least 99% of the time

Values: See Appendix 4

**4.420 STAND AGE** -- Record the average total age, to the nearest year, of the trees (plurality of all live trees not overtopped) in the predominant STAND SIZE CLASS of the condition, determined using local procedures.

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, estimates of stand age should estimate the time of tree establishment (e.g., not age at the point of diameter measurement). 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 of the core and 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 100%, compute the weighted average age, and record. For example, if three trees aged 34, 62, and 59 years represent 25 percent, 60 percent, and 15 percent of the overstory, respectively, the weighted stand age should be:

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

STAND AGE WORKSHEET			
SPECIES	RING COUNT PLUS 5 YEARS	PERCENT OF OVERSTORY	WEIGHTED AGE
xxx	xxx	xx	xxx
833	034	25	009
316	062	60	037
129	059	15	009
		100%	055

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 that, 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:** Previous periodic inventory records should not be used to determine STAND AGE due to a difference in old and current procedures.

When collected: All accessible forest land condition classes

Field width: 3 digits

Tolerance: +/- 10%,

MQO: At least 95% of the time

Values: 000 to 997, 998, 999

**4.431 DISTURBANCE 1** -- Record the code corresponding to the presence of the following disturbances. Disturbance can connote positive or negative effects. **The area affected by any natural or human-caused disturbance must be at least 1.0 ac in size.** Record up to three different disturbances per condition class from most important to least important as best as can be determined. This attribute is ancillary; that is, contrasting conditions are never delineated based on variation in this attribute.

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

**The disturbance codes below require "significant threshold" damage, which implies mortality and/or damage to 25 percent of individual trees in the condition class.**

When collected: All accessible forest land condition classes

Field width: 2 digits

Tolerance: No errors

MQO: At least 99% of the time

Values:

- 00** None - no observable disturbance
- 10** Insects
- 20** Disease
- 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
  - 46** Domestic animal/livestock (includes grazing):
- 50** Weather damage
  - 51** Ice
  - 52** Wind (includes hurricane, tornado)
  - 53** Flooding (weather induced)
  - 54** Drought
- 60** Vegetation (suppression, competition, vines)
- 70** Unknown / not sure / other (include in GENERAL NOTES)
- 80** Human-caused damage – any significant threshold of human-caused damage not described in the DISTURBANCE codes listed above or in the TREATMENT codes listed below.

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

When collected: When DISTURBANCE 1 > 00

Field width: 4 digits

Tolerance: No errors

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

**4.433 DISTURBANCE 2** -- If a stand has experienced more than one disturbance, record the second disturbance here. See DISTURBANCE 1 for coding instructions.

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

**4.435 DISTURBANCE 3** -- If a stand has experienced more than two disturbances, record the third disturbance here. See DISTURBANCE 1 for coding instructions.

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

**4.491 TREATMENT 1** -- Record the code corresponding to the presence of one of the following treatments since the last inventory cycle or within the past 5 years. **The area affected by any treatment must be at least 1.0 ac in size.** Record up to three different treatments per condition class from most important to least important as best as can be determined. This attribute is ancillary; that is, contrasting conditions are never delineated based on variation in this attribute.

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

When collected: All accessible forest land condition classes

Field width: 2 digits

Tolerance: No errors

MQO: At least 99% of the time

Values:

- 00** None - No observable treatment.
- 10** Cutting - The removal of one or more trees from a stand.
- 20** Site preparation - Clearing, slash burning, chopping, disking, bedding, or other practices clearly intended to prepare a site for either natural or artificial regeneration.
- 30** Artificial regeneration - Planting or direct seeding has resulted in a stand at least 50% stocked with live trees of any size.

- 40** Natural regeneration - Growth of existing trees and/or natural seeding has resulted in a stand at least 50% stocked with live trees of any size.
- 50** Other silvicultural treatment - The use of fertilizers, herbicides, girdling, pruning or other activities (not already listed above) designed to improve the commercial value of the residual stand.

NOTE: If code 10 is recorded, then code 20, 30, 40 and 50 may also apply as well as the regional variable 4.460 STAND HISTORY.

**4.492 TREATMENT YEAR 1** -- Record the year in which TREATMENT 1 occurred.

When collected: When TREATMENT 1 > 00

Field width: 4 digits

Tolerance: No errors

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

**4.493 TREATMENT 2** -- If a stand has experienced more than one treatment, record the second treatment here. See TREATMENT 1 for coding instructions, code 00 if none.

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

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

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

**4.440 PHYSIOGRAPHIC CLASS** -- Record the code that best describes the PHYSIOGRAPHIC CLASS of the condition; land form, topographic position, and soil generally determine physiographic class. As a rule of thumb, look over the annular plot area to determine physiographic class, but always use your best judgment when assessing any condition level variables.

When collected: All accessible forest land condition classes

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 described above.

**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 mountaintops and saddles.

24 Narrow Flood Plains / Bottomlands - Flood plains and bottomlands, less than ¼ 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 ¼ mile limit. Excludes swamps, sloughs, and bogs.

- 25**     Broad Flood Plains / Bottomlands - Flood plains and bottomlands, ¼mile 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 described above.
- Hydric**     **Sites that generally have a year-round abundance or over-abundance of moisture. Hydric sites are very wet sites where excess water seriously limits both growth and species occurrence.**
- 31**     Swamps / Bogs - Low, wet, flat forested areas usually quite extensive that are flooded for long periods of time except during periods of extreme drought. Excludes cypress ponds and small drains.
- 32**     Small Drains - Narrow, stream-like, wet strands of forest land often without a well-defined stream channel. These areas are poorly drained or flooded throughout most of the year and drain the adjacent higher ground. Example, riparian areas.
- 33**     Bays and Wet Pocosins - Low, wet, boggy sites characterized by peaty or organic soils. May be somewhat dry during periods of extended drought. Example, the Carolina bays in the southeast US. (See Appendix 7 GLOSSARY for definitions of bays and pocosins.)
- 34**     Beaver ponds
- 35**     Cypress ponds
- 39**     Other hydric - All other hydric physiographic sites.

**4.450 TIMBER MANAGEMENT CLASS** -- Timber management class identifies the physical opportunity to improve stand conditions through application of management practices. Assign a timber management class to all forest land uses. This class should be the most appropriate one for the stand. The stand is that group of trees, represented by the plot, or condition class, of the same forest type and generally the same size of timber.

When collected: All accessible forest land condition classes

Field width: 2 digits

Tolerance: No errors

MQO: At least 80% of the time

Values:

- 01** Regeneration without Site Preparation: The area is characterized by the absence of a manageable stand because of inadequate stocking of growing stock trees. Growth will be considerably below potential for the site if the area is left alone. Prospects are not good for natural regeneration. Artificial regeneration will require little or no site preparation.
- 02** Regeneration with Site Preparation: The area is characterized by the absence of a manageable stand because of inadequate stocking of growing stock. Growth will be considerably below potential for the site if the area is left alone. Natural or artificial regeneration will require site preparation.
- 03** Stand Conversion: The area is characterized by stands of undesirable, chronically diseased, or off-site species. Growth will be considerably below potential for the site if the area is left alone. The best prospect is for conversion to a different type or species.
- 04** Thinning Seedlings or Saplings: The stand is characterized by a dense stocking of growing stock. Stagnation appears likely if left alone. Stocking must be reduced to help crop trees attain dominance.
- 05** Thinning Poletimber: The stand is characterized by a dense stocking of growing stock. Stocking must be reduced to prevent stagnation or to confine growth to fewer, high quality crop trees.
- 06** Other Stocking Control: The stand is characterized by an adequate stocking of seedlings, saplings, and/or poletimber growing stock, mixed with competing vegetation either overtopping or otherwise inhibiting the development of crop trees. The undesirable material must be removed to release overtopped trees, prevent stagnation, or to improve composition, form, or growth of the residual stand.
- 07** Other Intermediate Treatments: The stand would benefit from other special treatments, such as fertilization to improve the growth potential of the site, or pruning to improve the quality of the individual crop trees.

- 08** Clear cut Harvest: The area is characterized by a mature or over mature sawtimber stand of sufficient volume to justify a commercial harvest. The best prospect is to harvest the stand and regenerate.
- 09** Partial Cut Harvest: The stand is characterized by pole timber or sawtimber sized trees with sufficient merchantable volume for a commercial harvest, which will achieve intermediate stand treatment needs or prepare the stand for natural regeneration. The stand is of a favored species composition, and may be even or uneven aged. Included are such treatments as commercial thinning, seed tree or shelterwood regeneration, and the selection system to maintain an uneven age stand.
- 10** Salvage Harvest: The stand is characterized by excessive damage to merchantable timber due to fire, insects, disease, wind, ice, or other destructive agents. The best prospect is for removal of damaged or threatened material.
- 11** No Treatment: The stand is characterized by an adequate stock of growing stock trees in reasonably good condition.

NOTE: If the area cut is greater than 1 acre, then variable 4.491 TREATMENT code 10 may also apply.

**4.460 STAND HISTORY** -- Based upon conditions within the condition class, record the code that best describes the harvesting activities since the last inventory.

When collected: All accessible forest land condition classes

Field width: 1 digit

Tolerance: No errors

MQO: At least 80% of the time

Values:

- 0** no evidence of harvesting
- 1** Clearcut: commercial or noncommercial clearcutting in blocks or patches
- 2** Partial cut: may include any harvesting situation where scattered individual trees or very small groups of trees were cut. Selection, diameter limit cutting, seed tree and shelterwood cuts should also be included.

- 3 Strip cut: a harvesting practice of cutting alternating strips of trees. A common example is to cut strips the width of a feller / buncher and leave similar strips uncut.

**4.465 STAND STRUCTURE** -- Record the code describing the basic form 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: All accessible forest land condition classes – **MAINE only**

Field width: 1 digit

Tolerance: No errors

MQO: At least 80% 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 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, or less than 5-percent cover in several western woodland types.

**4.470 STOCKING CLASS** -- Refer to the Relative Stocking chart in Appendix 6 to determine the level of stocking and then enter the appropriate code from the following list. Plots with more than one condition class delineated cannot use code 6. Code 6 is reserved for plots that have only one forested condition delineated.

When collected: All accessible forest land condition classes

Field width: 1 digit

Tolerance: No errors

MQO: At least 80% of the time

Values:

- |          |  |                              |
|----------|--|------------------------------|
| <b>1</b> | Nonstocked   | < 10 % stocking              |
| <b>2</b> | Poorly stocked   | ≥10 %, but < 35 % stocking   |
| <b>3</b> | Moderately stocked   | ≥ 35 %, but < 60 % stocking  |
| <b>4</b> | Well stocked   | ≥ 60 %, but ≤ 100 % stocking |
| <b>5</b> | Over stocked   | > 100 % stocking             |
| <b>6</b> | <b>100% of all subplots in the same forested condition</b><br>(i.e., total number of delineated condition <b>classes</b> is one) |                              |

**BOUNDARY DATA**

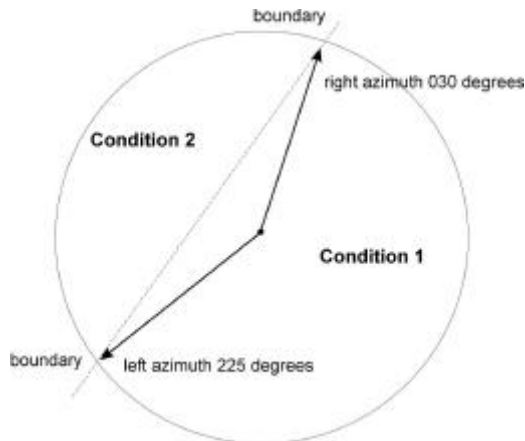
Boundary reference data are used to remeasure plots and to compute the area for the condition classes sampled on a plot. Record all boundaries between condition classes that occur within the sampled (fixed-radius) area on subplots and microplots (and optionally annular plots). Boundaries outside sampled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

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

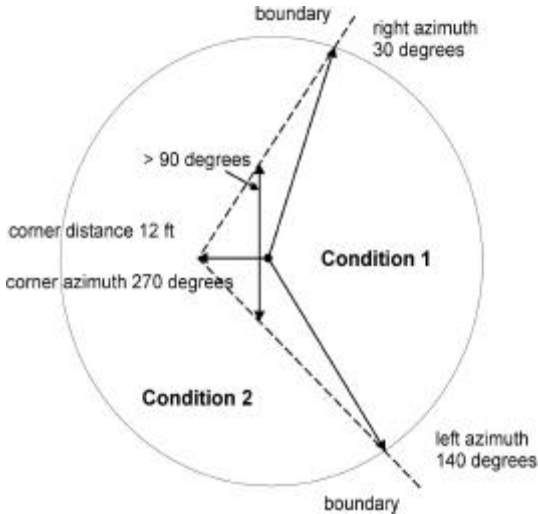
**REFERENCE PROCEDURE**

Reference, within the sampled area on each microplot and subplot, the approximate boundary of each condition class that differs from the condition class 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.

Boundary referencing is done by recording azimuths and distances from subplot center to the reference points (Figures 7 and 8). Each boundary is marked by a maximum of three points - two where the boundary intersects the subplot 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 7. How to measure a straight boundary on a microplot or subplot.**



**Figure 8. How to measure a boundary with a corner on a subplot or microplot.**

Microplot boundaries are referenced to the microplot 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 “Determination of Condition Class” and “Delineating Condition Classes Differing in Condition Class Status” for general condition class delineation guidelines. The following additional rules apply when referencing a boundary within a subplot or microplot:

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 ridgeline, 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, relative to subplot center, of the inclusion.

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

### BOUNDARY DATA

Record the appropriate values for each boundary mapped on the subplot or microplot.

**4.100 SUBPLOT NUMBER** -- Record the code corresponding to the number of the subplot.

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

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

**4.200 PLOT TYPE** -- Record the code to specify whether the boundary data are for a subplot and microplot.

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

**4.211 BOUNDARY CHANGE** -- Record the appropriate code to indicate the relationship between previously recorded and current boundary information.

When collected: 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 by a previous crew. Enter previous crew's boundary data exactly from history file printout. Do not change boundary data unless code 1, 2 or 3 applies.
- 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 **previously** recorded.
- 2 Boundary has been changed to correct an obvious gross error from previous crew.
- 3 Boundary has been changed to reflect a change in variable definition (i.e. procedural change).
- 9 Boundary no longer exists and requires deletion **due to an on the ground physical change, error by previous crew, or procedural change.** Enter previous crew's boundary data exactly from history file printout.

**NOTE:** In NH, **VT, MA, CT and RI** all the above codes are valid. In ME, NY, OH and PA apply code 1 only.

**4.212 CONTRASTING CONDITION** -- Record the CONDITION CLASS NUMBER of the condition class that contrasts with the condition class located at the subplot center (for boundaries on the subplot) or at the microplot center (for boundaries on the microplot), i.e., the condition class present on the other side of the boundary line.

When collected: All boundaries

Field width: 1 digit

Tolerance: No errors

MQO: At least 99% of the time

Values: 1 to 9

**4.213 CONDITION CLASS NUMBER** -- Record the condition class number of the condition at subplot center.

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

**4.214 LEFT AZIMUTH** -- Record the azimuth from the subplot, or microplot center to the farthest left point (facing the contrasting condition class) where the boundary intersects the subplot or microplot circumference.

When collected: All boundaries  
Field width: 3 digits  
Tolerance:  $\pm 10^\circ$   
MQO: At least 90% of the time  
Values: 001 to 360

**4.215 CORNER AZIMUTH** -- Record the azimuth from the subplot, or microplot 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:  $\pm 10^\circ$   
MQO: At least 90% of the time  
Values: 000 to 360

**4.216 CORNER DISTANCE** -- Record the horizontal distance, to the nearest 1 ft, from the subplot or microplot center to a boundary corner point.

When collected: All boundaries when CORNER AZIMUTH > 000  
Field width: 2 digits  
Tolerance:  $\pm 1$  ft  
MQO: At least 90% of the time  
Values:

1 to 7 ft Microplot  
1 to 24 ft Subplot

**4.217 RIGHT AZIMUTH** -- Record the azimuth from subplot or microplot center to the farthest right point (facing the contrasting condition) where the boundary intersects the subplot or microplot circumference.

When collected: All boundaries  
Field width: 3 digits  
Tolerance:  $\pm 10^\circ$   
MQO: At least 90% of the time  
Values: 001 to 360

**REGIONAL PROCEDURES IF SUBPLOT CENTER IS INACCESSIBLE DUE TO DENIED, HAZARDOUS CONDITIONS OR WATER** -- If the subplot center cannot be accessed, but a boundary can be accurately delineated to the contrasting condition, collect all the required data for the multiple conditions. If the boundary cannot be accurately delineated, then classify the entire subplot and microplot as the **CONDITION CLASS STATUS** at the subplot center.

Similarly, if the microplot center cannot be accessed, but a boundary can be accurately delineated to the contrasting condition, collect all the required data for the multiple conditions. If the boundary cannot be accurately delineated, then classify the entire microplot as the **CONDITION CLASS STATUS** at the microplot center.

Example 1: It is determined that subplot center falls in census water. The plot center is only 1 ft from the contrasting condition. The crew can safely stand on the edge of the contrasting condition and accurately delineate boundaries and rest of the data.

Example 2: It is determined that the subplot center falls in area that has been denied. The plot center is only 1 ft from contrasting condition. However, the crew cannot safely stand on the edge of the contrasting condition due a pair of pit bulls that patrol the perimeter of the denied property. Instead of taking a chance with the dogs, the crew classifies the entire subplot as denied.

In Appendix 10 there are additional mathematical instructions on how to obtain boundary information if the subplot center cannot be occupied.

**SUBPLOT DATA**

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. **If the subplot center cannot be accessed, do not collect and record data on the subplot except for SUBPLOT NUMBER, SUBPLOT and MICROPLOT CENTER CONDITION (and in the Northeast record 999 for SLOPE and ASPECT and 99 for SNOW/WATER DEPTH).**

**4.100 SUBPLOT NUMBER** – Record the code corresponding to the number of the subplot.

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

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

**4.105 SLOPE CORRECTION** -- Record the amount of slope correction that was applied, to the nearest tenth of a foot, while traversing from subplot 1 to subplots 2, 3, and 4.

When collected: At subplots 2, 3 and 4  
Field width: 3 digits  
Tolerance: No errors  
MQO: At least 99% of the time  
Values: 001 to 999

**4.106 SUBPLOT CENTER CONDITION** -- Record the CONDITION CLASS NUMBER (4.300) 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

**The 120.0 ft traverse from subplot 1 to new subplots 2 through 4 has a tolerance of  $\pm 7.0$  ft. If subplots 2 through 4 were previously established (i.e., SK 5), do not move the subplot center. If there is gross error, make a notation on the plot record and contact your supervisor.**

**4.107 MICROPLOT CENTER CONDITION** -- Record the **CONDITION CLASS NUMBER (4.300)** of the condition class at the microplot center.

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

**The 12.0 ft traverse from subplot center to a new microplot center has a tolerance of  $\pm 1.0$  ft. If the microplot was previously established (i.e., SK 5), do not move the microplot center. If there is gross error, make a notation on the plot record and contact your supervisor.**

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

If slope changes gradually across the subplot, record an average slope. If slope changes across the subplot but the slope is predominately of one direction, code the predominate slope percentage rather than the average. If the subplot falls directly on or straddles a canyon bottom or narrow ridge top, code the slope as follows:

- If the subplot falls directly between two side hills, 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.

When collected: All subplots with accessible forest land  
 Field width: 3 digits  
 Tolerance:  $\pm 10\%$ ,  
 MQO: At least 90% of the time  
 Values: 000, 005 to 155

000	no slope, slope < 5 percent
005	5%
.	
155	155%

**4.120 SUBPLOT ASPECT** -- Record the aspect across the subplot, to the nearest 1 degree. SUBPLOT ASPECT is determined along the direction of slope for land surfaces with at least 5 percent slope in a generally uniform direction. SUBPLOT ASPECT is measured with a hand compass along the same direction used to determine slope. If aspect changes gradually across the subplot, record an average aspect. If aspect changes across the subplot but the aspect is predominately of one direction, code the predominate direction rather than the average.

If the subplot falls on or straddles a canyon bottom or narrow ridge top, code aspect as follows:

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

When collected: All subplots with an accessible forest

Field width: 3 digits

Tolerance: +/- 10°

MQO: At least 90% of the time

Values:

000	no aspect, slope < 5 percent
001	1°
002	2°
360	360°, due north

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

When collected: All subplots with an accessible forest land condition class (CONDITION CLASS STATUS = 1)

Field width: 2 digits (x.y)

Tolerance: ± 0.5 ft at the time of measurement

MQO: No MQO after initial date of visit

Values: 00 to 99

**4.130 CROWN CLOSURE** -- Estimate the percent of the subplot area that is covered by live tree crowns 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: All subplots with accessible forest land – **MAINE only**

Field width: 1 digit

Tolerance: ± 1 class

MQO: At least 90% of the time

Values:

- 0**      0 to 25 percent
- 1**      26 to 50 percent
- 2**      51 to 75 percent
- 3**      Greater than 75 percent

The following is an example on how a plot diagram and various sections of the tally record is recorded for multiple condition classes.

Example on how to record multiple condition classes

CONDITION DATA				SUBPLOT LEVEL DATA								BOUNDARY DATA								
CONDI CLASS NUMBER	CONDI CLASS STATES	LAND USE CLASS		SUBPLOT NUMBER	SLOPE CORRECTION	SUBPLOT CENTER CONDITION	MICROPLOT CENTER CONDITION	SUBPLOT SLOPE	SUBPLOT ASPECT	SNOW/ WATER DEPTH	CROWN CLOSE CLASS	SUBPLOT NUMBER	PLOT TYPE	BOUNDARY CHANGE	CONDI CLASS NUMBER	CONDI CLASS NUMBER	LEFT AZ TO BOUNDARY	CORNER AZ TO BOUNDARY	RIGHT AZ TO BOUNDARY	
4300	4310	4320		4300	4301	4302	4303	4304	4305	4306	4307	4300	4301	4302	4303	4304	4305	4306	4307	4308
X	X	XX		X	XXX	X	X	XXX	XXX	XX	X	1	1	1	2	1	300	000	00	055
1	1	40		3		1	1	006	045	10		2	1	1	4	3	020	150	11	120
2	3	92		2	015	3	4	010	180	00		2	1	1	2	3	120	000	00	243
3	1	20		3	000	5	5	005	090	15		3	1	1	1	5	208	000	00	315
4	2	61		4	000	1	1	005	060	05										
5	4	91																		

Condition Class Numbering Example

