



ECOLOGICAL SCIENCES—FORESTRY TECHNICAL NOTE

Forest Inventory & Summary Form MT-ECS-1

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Introduction: The following provides instructions to use the Forest Inventory & Summary Form, MT-ECS-1. The form allows for collecting data in both even-aged and uneven-aged stands and provides an efficient means of recording and summarizing field inventory data for forest planning. Zigzag transect and fixed plot sampling methods are used. These inventory methods and the tools needed for the inventory are explained in the National Forestry Handbook (NFH). The inventory methods are explained in Part 636.2 of the NFH. The inventory tools are described in Part 636.3 of the NFH. The National Forestry Handbook can be found at the following site <http://soils.usda.gov/technical/nfhandbook/>. Variations to the handbook instructions are described in this technical note.

General: Planners will be able to use this forest inventory and summary form if they are familiar with inventory methods, NRCS forestry practice standards and understand basic forest terminology. The state staff forester is responsible for any summary form editing or revising. The original summary form is protected so that the summary form can not be corrupted accidentally.

The Forest Inventory and Summary Form can be downloaded from the Montana public FTP site address <ftp://ftp-fc.sc.egov.usda.gov/MT/technical/forestry/>. Open the folder and select the four Microsoft Excel files named MT-ECS-1pg1.xls, MT-ECS-1pg2.xls, MT-ECS-1pg1sample.xls, and MT-ECS-1pg2sample.xls. Save the files in the desired location.

The form is designed to assist planners identify forest stand conditions, evaluate resource needs, and to develop treatment specifications according to the Field Office Technical Guide (FOTG), Section IV—Practice Standards and Specifications, 666—Forest Stand Improvement and 612—Tree/Shrub Establishment.

FEATURES: The form is used to record and summarize forest inventory data needed for conservation planning. It summarizes and describes:

- 1) Stand characteristics for each age class
 - Species composition and condition
 - Stocking
 - Age
 - Average diameter
- 2) Site productivity
 - Site Index
 - Radial growth
- 3) Wood volumes by harvest options
- 4) Stand health concerns
- 5) Additional notes on concerns and treatments

PRINTING: The summary form can be printed using the default office laser printer.

DEFINITIONS: Definitions listed below may vary from those in the National Forestry Manual.

- **Stand**—Forested areas that are reasonably uniform with respect to the productivity, species composition and condition, diameters, ages, and number of age classes. Stands may be even-aged, i.e. having only one age class; or uneven-aged, i.e. having several age classes.
- **Age Class**—Usually those trees within a 20-year age span.
CAUTION: *Age of trees does not always correlate to size.* Younger trees may be larger than older trees. The planner should age enough trees to confidently distinguish trees within the same age class.
 - **Main Age Class**—Usually considered the most dominant—possibly most heavily stocked—age class in a stand and the principal focus of the client’s decisions. It could also be the oldest age class.
 - **Secondary and Tertiary Age Classes**—Other less dominant age classes that may be younger or older than the main age class.
 - **Tree Regeneration**—Young trees—generally less than 20-30 years old—less than 5” DBH.
- **Species**—Common name symbols—such as PP for ponderosa pine, DF for Douglas-fir, etc.
- **Distance**—Measured from the center of one sample tree at DBH to the next, in feet.
- **Diameter**—The diameter of the tree at breast height (DBH), taken at 4.5 feet, in inches.
- **Condition**—Determine whether each tree is in Good (G), Fair (F), or Poor (P) condition based on the tree’s health, crown fullness, straightness, and any evidence of scars, wounds, insects, or disease. It may be useful to document reasons for F or P ratings in the NOTES column with codes, e.g., L—lean, S—sweep, F25—fork@25’, TC—thin crown, DMT—dwarf mistletoe, RR—root rot, etc.
- **Height**—The measured or estimated height of the tree in feet.
- **Volume**—Estimate the volume in board feet using the *Scribner rule: total height* volume table in the Woodland Field Handbook. For trees less than 8” DBH estimate the cubic feet volume using the *cubic feet: total height* table in the Woodland Field Handbook.
- **Basal Area (BA)**—The cross-sectional area of a tree trunk at DBH recorded in square feet. This is one way to express stocking, especially in uneven-aged stands. Convert DBH to BA using the reference below the Overstory Summary block at the bottom of the page.
- **Expansion Factor (EF)**—Used to convert the inventory data to an acreage basis. The EF is calculated according to the formula shown.

INSTRUCTIONS: Record client, stand and plot/transect number, stand acres, location, planner, and date.

Zigzag Transect Data Block

- 1) In even-aged stands (one age class) run a transect measuring 20 mature– >30 years old– trees. Follow procedures shown in the National Forestry Handbook.
- 2) In uneven-aged stands (two or more age classes) run a transect measuring 30 trees. All mature trees, regardless of age class, are counted in the transect. Record species of each tree in the appropriate Age Class column: Main, Secondary, or Tertiary.
- 3) Record distances, diameters, and condition of each tree in the transect.
- 4) Record heights for several trees representing different species and diameters. This is useful when calculating tree volumes.
- 5) Sum up and average the Distance column and enter this in the *Overstory Summary Block*.
- 6) Sum up and average the Diameter column by age class and enter this in the *Overstory Summary Block*.
- 7) Total both Volume columns (by age class, if desired) for both board foot and cubic foot. Refer to volume tables in the Woodland Field Handbook.
- 8) Blank columns may be used for running treatment options in the transect data.

Fixed Plot Data Block

- 1) Understory regeneration—young seedling and sapling-sized trees— <30 years old— should be recorded in the fixed plot section.
- 2) Use only one size of circular plot during the inventory. Where understory trees are sparse, use a larger plot size, e.g., 1/20th acre. Where stocking is dense, use a smaller plot size, e.g. 1/200th acre.
- 3) Locate plots as part of a zigzag transects. Pre-select several sample points along the transect. Ex. Take plots at tree numbers 3, 8, 11, 13, and 19. Locate plot center 10 to 15 feet away from the sample tree to avoid effects of tree canopy.
- 4) Tally seedlings and saplings in the plots according to species, size, and condition—Good or Poor only.
- 5) Total columns and rows. Calculate the average and total per acre values.

Overstory Summary Block

• Even-aged vs. Uneven-aged

- > Stocking is expressed in terms of trees/ac or basal area/ac with guidance found in the FOTG, Section IV—Practice Standards and Specifications, 666—Forest Stand Improvement. These stocking levels may be adjusted to meet other objectives such as grazing, wildlife, or removal of undesirable trees.
- > In even-aged stands use the D + X spacing guides and record information in the One Age Class summary block. In uneven-aged stands use the basal area/acre guides and record information in the Two + Age Classes summary block.

- **Average Diameter**—The existing average diameter of the trees by age class.
- **Average Spacing**—The existing average spacing or distance between trees for the whole stand.
- **Current D + X Spacing**— $X = (\text{Average Spacing}) - (\text{Average Diameter})$ Even-aged stands only.
- **Desired D + X Spacing**—See FOTG, Section IV—Practice Standards and Specifications, 666—Forest Stand Improvement. Even-aged stands only.
- **Desired Average Spacing**—The desired D + X spacing, expressed in feet. Even-aged stands only.
- **Current Trees/Acre**— $(EF) \times (\text{Number of trees in transect or in each age class of transect})$.
- **Desired Trees/Acre**— $43,560 / (\text{Desired Average Spacing})^2$
or for each age class $(\text{Desired BA/ac} / \text{Ave BA/tree})$.
- **Excess Trees/Acre**— $(\text{Current Trees/Acre}) - (\text{Desired Trees/Acre})$.

Overstory Summary Block CONTINUED

- **Current Basal Area/Acre**– (Average BA/tree) x (Current Trees/acre) for each age class.
- **Desired Basal Area/Acre**–See FOTG, Section IV–Practice Standards and Specifications, 666–Forest Stand Improvement. Record this value in the Total column. The desired BA/ac for each age class is determined by stand treatment options and must add up to the Total.
- **Excess Basal Area/Acre** – (Current BA/Ac) – (Desired BA/Ac).

Stand Composition and Condition Block–Condensed from the zigzag transect and fixed plot data.

- 1) In each age class section record the smallest and largest diameter tree in the Diameter Range area.
- 2) In each age class count the numbers of trees sampled in the transect/plots and determine the percent composition of each species.
Ex. If 20 trees recorded in the Main Age Class and 5 are DF, then DF is 25% of that age class.
- 3) Within each species in each age class count the number of trees in Good, Fair, and Poor condition in the transect/plots and determine the percent of each.
Ex. If 6 PP are in the Main Age Class and 3 are in Good condition, then 50% of PP are in Good condition.

Forest Health Block

Record site features pertaining to stand health and fire hazards. Degree of concern may be a subjective rating, or use appropriate evaluation tools.

Site Index & Radial Growth Block

- 1) For site index select dominant or co-dominant trees of the major species in the stand for measurement. Bore several trees and count the number of rings. Measure tree diameters and heights. Use the Woodland Field Handbook to estimate the site index. A narrow range of values is preferred, e.g. ± 5 in 50 year base age index tables, and ± 10 in the 100 year index tables
- 2) To determine radial growth, use site index trees for stand potential and/or sample other trees to gauge response from past treatments. Record the species, rings per inch during the fastest growth period (rpi-Best), and rings per inch during the most recent growth period (rpi-Last). If the difference between the two measurements is small, a thinning may not be needed. If the difference is large, thinning might benefit the stand.

Harvest Options Block

- 1) Record the total volume/acres from the Zigzag Transect Block. Add all individual tree volumes and multiply by the EF for 'per acre' values and record these volumes in the Clear-cut treatment option.
- 2) Other treatment options can be run using trees in the Zigzag Transect Block as a model of the existing forest stand.
 - a) Record the volume of individual trees planned for removal in the blank columns of the data block. Add up and multiply by the EF for 'per acre' values.