# Tree Inventory Plan

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We hope this information will be useful to you; reference to it will assist you with many of the questions that will arise in your tenure with municipal government. However, the *Tennessee Code Annotated* and other relevant laws or regulations should always be consulted before any action is taken based upon the contents of this document.

Please feel free to contact us if you have questions or comments regarding this information or any other MTAS website material.

Sincerely,

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# Tree Inventory Plan

Reference Number:
MTAS-1362

*[The following text in this Tree Inventory Section was prepared by State Forester Bruce Webster.]*

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### *Tree Inventory Plan*

The simplest form of inventory is a tree count. It is the quickest, easiest, cheapest inventory, and it can be done by anyone who can count. The results would be useful to someone who might want to know the number of trees on a given property or within a certain area, but a simple tree count has major limitations. Almost immediately questions such as “What kinds of trees are there?” or “How big are they?” are asked.

It is of the utmost importance to ask these types of questions before an inventory is conducted. A manager or owner must decide what information he or she needs and how that information will be used. Is knowing the tree species important? How much detail about tree location is required? Gathering information about trees is expensive and time consuming. Collecting more information than is needed is wasteful, but gathering too little information would necessitate redoing the inventory.

Why is an inventory of trees so important? There are several reasons. First, trees are a community resource. They produce shade, absorb air pollutants and mitigate storm water runoff. They have a direct, measurable positive economic benefit to a community. Second, trees provide psychological and aesthetic benefits. Third, trees are long lived, and as such, need to be considered part of the capital assets of the community. Fourth, trees need periodic maintenance. Because they are long lived, they cannot be ignored without adverse consequences to the community. And finally, they are large organisms and can create conflicts with and cause damage to homes, cars and other community assets.

### *Repeating the Inventory*

Because trees are biological organisms, they create a dynamic environment. The forest or landscape is not static; it is constantly changing. Therefore, while data from the first inventory is used to guide development of the tree management, maintenance, or planting plan, the trees are changing, creating the need to repeat the inventory after a period of years.

The second inventory can be more valuable than the first because an inventory is a picture of the trees when data are collected. The second picture not only provides the basis for the revised management plan, it can be compared with the first and reveal the changes and trends that are occurring. To accurately capture these trends and changes, the same area must be inventoried the second time, whether or not it is the same plots or landscaped areas.

# Inventory Techniques

Reference Number:
MTAS-1363

The task of developing an inventory of a forest can be daunting. For instance, how does one go about getting information about a plot of forestland that is 200 to 300 acres in size? It would be impossible to measure and record every tree.

Foresters collect data from sample plots from the forest. The plot may be a quarter-acre in size, and they might take data from 25 to 30 plots. Within each plot the species; tree sizes, usually diameter and log length; conditions, especially of the trunks; and locations are recorded. The location includes the plot location within the forest, and many times the locations of individual trees within the plot.

The data from all the plots are then summarized, and a process called developing an assessment of the woods is completed. This leads to the development of a plan for the forest.

When inventorying urban and landscape trees, the system may employ a plot sampling or a complete inventory. For public trees, a complete inventory typically is undertaken. The argument for this is that since it is not a natural forest, sampling would not give statistically valid data, and the information gathered may be applied directly to management needs for an individual tree. Again, data from all the trees are summarized in an assessment then used to develop a management plan. If other aspects of the urban forest, such as private property or wooded areas, need to be inventoried, a sampling technique may be employed.

What technique should be used in a greenway where there is a mix of landscape trees and forestland? It may require both techniques and two inventories. The landscape tree inventory may be used for landscape trees in mowed areas, while a sampling may be used in wooded areas.

Because greenways may be long narrow strips of land, a special plot system may be employed that takes a cross section of the greenway at periodic intervals.

An aerial imagery inventory has its own unique set of uses and has a completely different approach with its unique data set

of information collected.

## Data Collection

Reference Number:
MTAS-1364

Generally there are four pieces of information collected on each tree during an inventory: species, size, condition and location. Many inventories include work needed as a fifth piece of information, but here it will be considered a subset of the condition determination. The reasoning is that a poor condition rating often can be attributed to a lack of maintenance, and completing tree maintenance often improves the condition rating. Tennessee's inventory system also includes a target classification, which is a component of evaluating whether a tree is hazardous.

### *A Note About Planting*

In addition to recording information about trees, an inventory often samples tree spaces so that managers can have an indication of planting needs. Obviously, species, size and condition data cannot be collected on a tree that isn't there, but the potential location of a tree is important in developing the long-term management plan.

## Species

Reference Number:
MTAS-1365

Knowing what trees are growing in the park, greenway, or other forested area is vital. The types and frequencies of trees can provide a significant amount of information. For instance, an area dominated by one species can indicate the potential for insect and disease problems. (Dutch elm disease taught us that a monoculture of American elms along city streets is an invitation to disaster.) Also, knowing the species mix present can be a guide to developing diversity by planting less common species of trees.

Information on species typically is recorded by species name. Either the common or the scientific name can be used. Some inventory systems use a species code. This is useful to speed data recording, but it requires familiarity with the codes. Unless an individual is doing an extensive inventory, memorizing codes is not practical.

Occasionally inventories will record variety or cultivar, if known. Because cultivars and varieties are so similar to the species, collecting this information typically is not recommended unless there is a specific use for this data. An inventory will sometimes record only genus information, such as oak, elm or hickory, but species specific information is preferred.

## Size

Reference Number:
MTAS-1366

There are three components that make up tree size. They are diameter or circumference of the trunk, height or crown height, and crown spread (canopy cover).

Measurements of forest trees include diameter or circumference and a trunk height. These dimensions give the volume of wood in a tree that then can be converted to lumber.

Urban and landscape trees may be measured in any number of ways. The most common is to measure diameter because of the speed and convenience of collecting data while giving an indication of size. This data can be used to make general conclusions about age of a population. (Species frequency may skew any age conclusions if the tree population includes a significant number of small maturing trees. Also, any direct correlation between size and age for an individual tree cannot be determined.)

Other size measurements may be taken if specialized data is needed. This relates back to the real purpose of doing an inventory. For instance, crown spread and crown height may be measured to give data on total canopy cover and crown volume over the landscape, which can be plugged into formulas that calculate the amount of solar or rainfall interception (heat island effect, storm water impact). Another size measurement combination could be trunk diameter and trunk height that would give information about urban tree biomass (biomass energy potential).

Some tree inventory systems record the actual tree size, while others use a size class. The advantage to record the actual trunk diameter in 2" diameter classes is that detailed information is gathered but can be categorized into size classes. Commonly used size classes are 0-6", 7-12", 13-18", 19-24", 25-30", and 31" and up.

## Condition

Reference Number:

MTAS-1367

The purpose of recording condition is to get a general idea of the health and potential hazard of the tree. Condition looks at insect and disease problems, structure of the tree's limbs, crown balance, foliage color (if available), trunk decay and missing bark, trunk flare wounds, estimate of life expectancy, growth (twig), dieback and other potential problems.

Assessment: Condition is usually converted to a numeric code relating to the factors mentioned. A common condition class system uses a 1 through 5 condition rating, with 1 being excellent condition. Other systems may use 1 through 10.

If the purpose of the inventory is to implement maintenance on the tree population, then recording the work needed is required. Work needed may include removal, light or extensive pruning, insect or disease treatment, or other intervention. If the purpose of the inventory is to evaluate tree hazard, then potential failure and potential target are subsets of the condition class that should be recorded.

## Location

Reference Number:
MTAS-1368

Location data is driven primarily by the amount of detail needed. If the purpose of the inventory is to have a general idea about the tree population within a park or certain area of a community, identifying that tree within the park or community may be sufficient. The location usually is identified sufficiently so that an individual tree may be found by another person. This detail can be provided by GPS coordinates or through construction of a map when the inventory is completed or with other detailed location methods. A detailed location must be recorded if follow-up evaluation or maintenance of an individual tree is one of the purposes of conducting the inventory.

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