

## **Jefferson Square Park Whittaker Plot- Background Information and Protocol**

Trees are typically the dominant form of vegetation in a forest. They perform essential ecosystem services such as regulating the biogeochemical cycles and providing habitat. Trees and forests help clean the environment by processing toxins from the air and soil and providing carbon sequestration or carbon sinks. Ecological services of trees in urban settings are intercepting rainfall, absorbing volatile organic compounds, and providing shade; thus reducing the amount of energy and fossil fuels used to cool homes and buildings.

Because of the value of forests ecosystems to humans, scientists have designed methods to collect data to help us understand, protect, and often restore forests. Ecologists use biological inventories and mapping to record, track, and study change that occur in a forest ecosystems. In this way scientists can track change over time in forest ecosystems and monitor biodiversity. Collecting data pertaining to forest structure and composition, and identifying and evaluating current forest conditions can be used to inform ecosystem management plans that work towards the preservation of biodiversity.

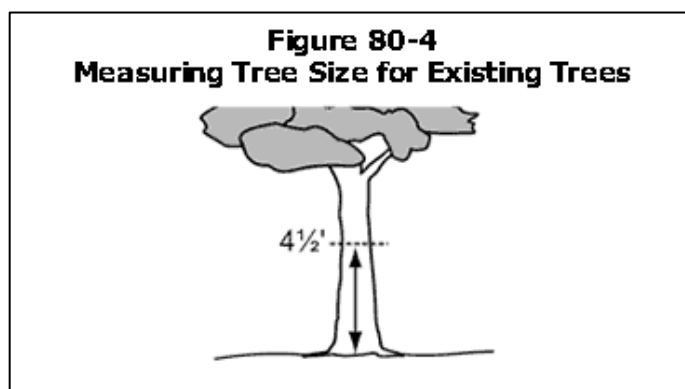
It is impractical to take a complete census (count) of even a relatively small site; descriptive statistics such as density, frequency, and relative abundance of plant species can be accurately estimated from as little as 1% of the community. Transects and quadrats are two ecological tools that allow us to quantify the relative abundance of organisms in an area. To track changes over time, it is important to be able to quantify changes in abundance.

A rectangular plot known as a belt transect will supply more data than a line transect. In this activity you will use a standard sampling method known as a Whittaker plot, which is a type of belt transect. Using handheld GPS units, your group will work together to delineate the boundaries of a 20-meter x 50-meter belt transect (1,000 m<sup>2</sup>; a tenth of a hectare). Then, using a standard sampling method, you will conduct a species composition inventory, as well as measure and record diameter at breast height and tree height. Gathering baseline data and tracking changes over time allows researchers monitor changes in abundance and biomass.

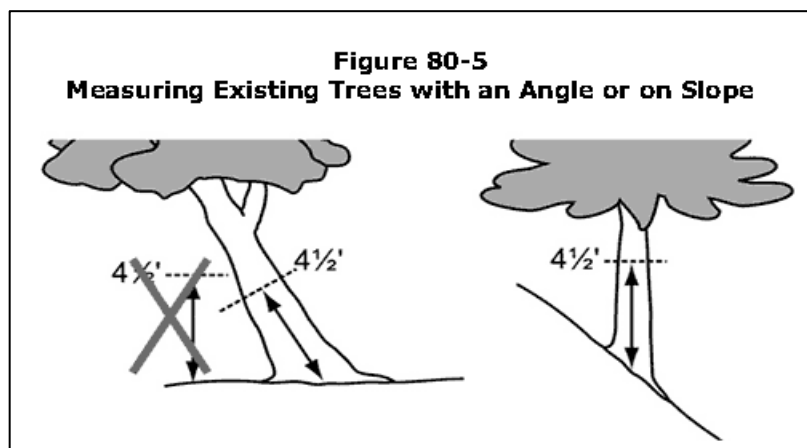
Tree height and diameter are often used as a gauge for assessing biomass of a forest which can then be used to assess the amount of carbon sequestration, rainfall interception/water retention, and air pollution absorption and so on. To ensure consistency over time, across plots and between data collectors, scientists use a standard measurement known as diameter-at-breast height (DBH) to measure the size of trees. DBH means the diameter of each tree is measured at “breast height”. The standardized “breast height” is defined as 4.5 feet (54 inches) above the ground, on the uphill side of the tree. DBH measurements can be used to estimate the volume, biomass, and carbon storage of trees.

## Jefferson Square Park Whittaker Plot- Background Information and Protocol

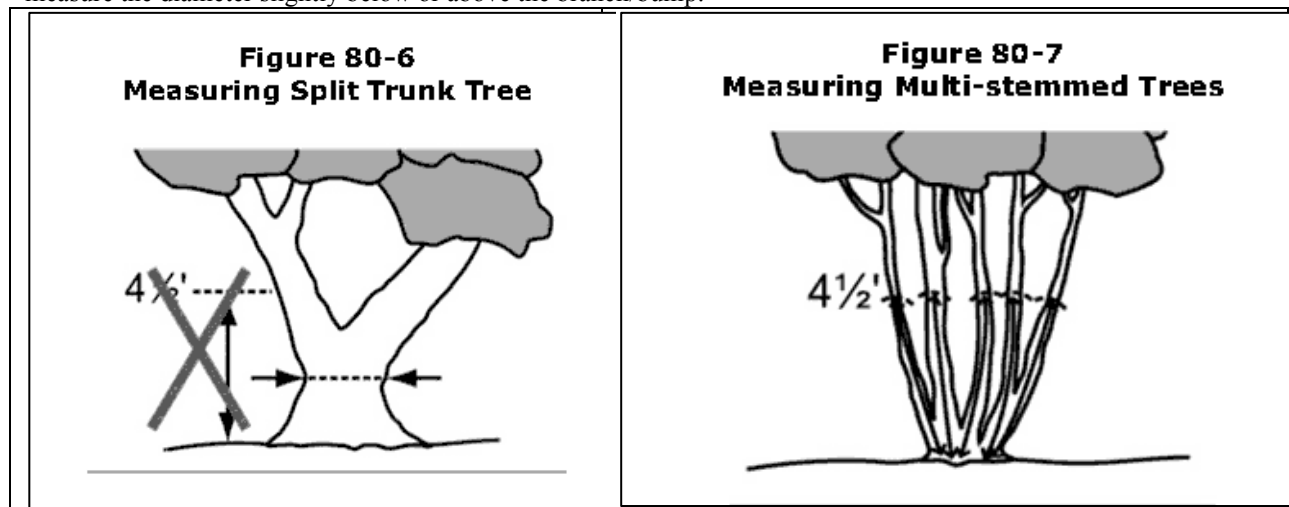
### Measuring Diameter at Breast Height (DBH)



**Figure 80-4.** When the trunk is at an angle or is on a slope, the trunk is measured at right angles to the trunk 4.5 feet along the center of the trunk axis, so the height is the average of the shortest and the longest sides of the trunk; see Figure 80-5.



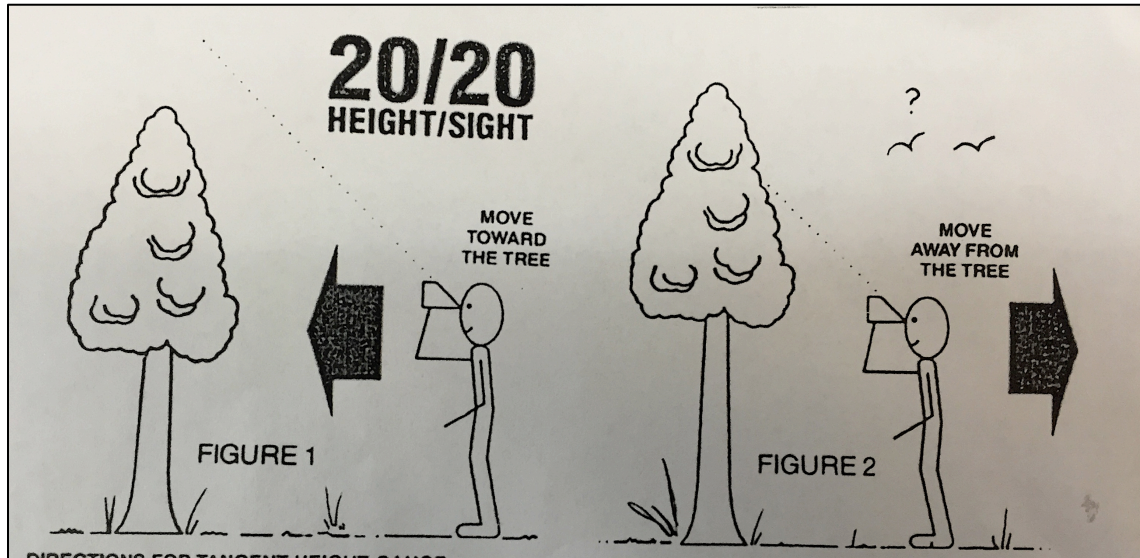
**Figure 80-6.** When the trunk branches or splits less than 4.5 feet from the ground, measure the smallest circumference below the lowest branch. See Figure 80-6. If the tree has a branch or a bump at 4.5 feet, it is better to measure the diameter slightly below or above the branch/bump.



**Figure 80-7.** For multi-stemmed trees, the size is determined by measuring all the trunks, and then adding the total diameter of the largest trunk to one-half the diameter of each additional trunk (see Figure 80-7). A multi-stemmed tree has trunks that are connected above the ground and does not include individual trees growing close together or from a common root stock that do not have trunks connected above the ground.

## Jefferson Square Park Whittaker Plot- Background Information and Protocol

### Measuring Tree Height



A tangent gauge is one tool that can be used to measure tree height. They are tricky to use, requiring patience and practice. Hands-on experience is the only way to learn how to measure tree height using this instrument.

### Whittaker Plot & Data Collection Protocol

Establish division of labor. There are three plots, so the class will divide into 3-Groups of 8. Students will cycle through each position:

- 2- data recorder
  - i. This position will focus on recording species, DBH and whether the tree is live or dead on the data sheet
- 4- Data collectors
  - i. This position will focus on measuring the DBH and tree height, identifying species, and whether it's alive or dead. They will communicate this to the data recorder
- 2- Edge attendants
  - i. This position will follow data collector along the edge of the plot to ensure all trees within the plot are measured and no trees outside the plot are measured. Edge attendants are also crucial for safety as they remind others to watch their step and alert others of potential hazards.

**Summary of positions:** There will be four data collectors. Data collectors will work in pairs; therefore there will be two pairs of data collectors. Within each pair, one data collector will measure the DBH of trees the other will identify the tree species. The data recorder who will record the data being dictated by the data collectors will follow the data collectors. The edge attendant will make sure that the data collectors and recorders are within the boundary of the plot and lookout for their safety, as they may be distracted while walking and collecting/recording data.

### Plot Marking Protocol

1. GPS navigator leads group to waypoint/center point of plot.
2. Mark center point with the stake with yellow flagging and drop bags.
3. Once the center or corner of plot is identified use the GPS units to locate corners and mark the corners with the orange flagged wire flags.