GUIDE TO JUDGING THE CONDITION OF A SHADE TREE[1]

by Bruce L. Webster

Abstract. The high degree of subjectivity involved in judging the condition of a shade tree pointed to a need for a method that would help quantify tree condition. The method described utilizes 6 factors involved in tree condition. Each factor is given a rating, and the sum of the ratings gives a numerical value equatable to a condition class. The method is useful when introducing shade tree condition to traditional foresters who may be unfamiliar with urban forestry, and may also be useful to individuals who need precise data of tree condition.

As most people dealing with urban forestry are aware, trying to arrive at an accurate appraisal of tree condition can be highly subjective. What one individual may judge as a tree in fair condition, another may place in the good category. Or worse yet, in some cases there can be a disparity of 2 or more condition classes.

The Forestry Division of the South Dakota Game Fish & Parks faced this problem in 1973 when the community forestry program was launched. We were in a position of hiring a summer forestry student to conduct street tree surveys. Those surveys required the student to note species, size, and condition. Since most upper level students have had dendrology, species identification posed little problems. Likewise, size or diameter was easy to determine. But condition class proved to be difficult to demonstrate.

By 1974, however, we had devised a formula for determining condition. This formula utilized 5 factors, and assigned a rating for each. These factors were directly related to visibly identifiable characteristics of a shade tree. The use of this formula helped to establish more consistency among surveyors. The method was revised in 1975, and then again in 1977, the latter revision designed to be used with the *Guide to the Professional Evaluation of Landscape Trees, Specimen Shrubs and Evergreens* produced by ISA, AAN, and other organizations.

The Condition Guide

The guide to judging shade tree condition utilizes 6 factors: trunk, growth rate, structure, insect and disease problems, crown development, and life expectancy. Each factor is given a rating between either one and three or one and five, with the higher number being the better rating. These ratings are based on easily identifiable visual characteristics assigned to each factor.

The trunk factor, rating 1-5. A tree trunk that is sound and solid throughout, has no visible deterioration present, and no visible damage to bark and cambium would receive a rating of 5. A rating of 4 may be assigned when there is minor cambium damage to an otherwise sound and solid trunk. A tree that is showing early signs of decay either by presence of a conk or other means would rate a 3. Likewise, bark and cambium damage, either through auto or construction damage would also rate a 3. A rating of two would combine the characteristics of extensive decay, hollowness, and some bark and cambium damage, although the overall cross-section of the trunk remains a circle. When there is extensive decay, very large sections of bark missing, the tree is hollow, and the cross-section is more of a half-circle rather than a full circle the rating assigned is a one.

Growth rate, rating 1-3. Growth rate is determined by measuring annual twig elongation. If

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growth rate exceeds 6 inches it is given a three. If it ranges from 2-6 inches, it is given a 2. If growth rate is less than 2 inches, it receives a rating of one.

These are general recommendations for many medium growth trees. Species that are either very fast or very slow growing have to be considered individually and may require the use of a different range of growth rate values.

Structure, rating 1-5. The structure of a tree addresses the development and placement of the major limbs and branches. In horticulture, this factor would be termed the scaffold. The rating is determined by 3 characteristics, radial placement of limbs; dead, broken or missing limbs; and narrow crotch angles.

A top rating of 5 means that there are no major limbs dead, broken or missing, no narrow crotch angles, and good radial distribution of branches. A tree with good radial branch distribution, but one that has a narrow crotch angle would receive a 4. A rating of 3 indicates that one of the major limbs is dead or broken, destroying the radial balance of the structure. If a tree has 2 or 3 major branches forming narrow crotches with at least one being broken, a rating of 2 is assigned. Finally, if 2 or more major limbs are dead, broken or missing, and there are several narrow crotch angles present, there can be no good radial placement of branches and the rating is one.

Insects and diseases, rating 1-3. If there are no pests present the tree would receive a 3. If there are one or two minor insect or disease problems present, such as leaf feeders or leaf diseases, the rating would be a two. If the insect or disease problem is serious, such as a canker disease, wilt disease, bark beetles or wood borers, the rating is one.

In addition, environmental considerations may also be involved in determining the pest rating. Such problems as air pollution, herbicide damage, leaf scorch, drought, flooding, etc. could be as serious and damaging as an insect or disease problem.

Crown development, rating 1-5. Crown development is based on balance and crown density, and indicates such problems as overcrowdedness, competition, dominance, etc. A rating of 5 indicates a dense leafy crown that is evenly balanced on all sides. If a tree is slightly unbalanced with crown development extended slightly in one direction, it rates a 4. A three would indicate a thin crown or a severe imbalance. One often sees this condition when street trees are overcrowded. A tree that has a slight imbalance combined with a thin crown would receive a 2, whereas a thin crown and severe imbalance would rate a one.

Life expectancy, rating 1-5. Life expectancy is the factor that is still rather subjective, because it is based on prediction, and as we all know, predictions can turn out to be false.

Life expectancy is a summary or catch all factor. It is related to all of the previous factors. For instance, one would hardly expect a high rating on life expectancy if the trunk is hollow and the structure is broken.

Some characteristics that influence life expectancy might be historical data about the tree or the care a tree has received. A tree with a history of defoliation might have a lower rating in life expectancy, even though all other fctors point to a highly rated tree. On the other hand, a narrow crotch angle likely to break could be cable braced, thus increasing the life expectancy.

The ratings for life expectancy are 5 for over 30 years, 4 for 25-30 years, 3 for 15-20 years, 2 for 5-10 years, and 1 for 5 years or less.

Rating for Condition Classes

In reviewing the six factors of condition just discussed, one notes that the total for all factors combined range from 26 to 6. This range is distributed over the five condition classes as follows:

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A. Trunk Condition

Sound & Solid	Sections of bark missing	extensive decay & hollow
5	3	1

B. Growth Rate (consider species)

more than 6" twig elongation	2-6" twig elongation	less than 2" twig elongation
3	2	1

C. Structure

Sound	one major/several minor limbs dead, broken, missing	2 or more major limbs broken, dead, missing
5	3	1

D. Insect & Disease

No pests present	1 pest present	2 or more pests present
3	2	1

E. Crown Development

Full & Balanced	full but unbalanced	unbalanced & lacking a full crown
5	3	1

F. Life Expectancy

over 30 years	15-20 years	less than 5 years
5	3	1

Condition Class:	*Percent*	*Rating*
Excellent:	80-100%	26-23
Good:	60-80%	22-19
Fair:	40-60%	18-14
Poor:	20-40%	13-10
Very Poor:	0-20%	9-6

To illustrate how this determination of condition class works, let's consider some specific examples.

Example #1. Tree one has a sound trunk with undamaged bark (5). Its growth rate is 4" (2), and the structure or scaffold has no narrow crotch angles or broken, dead or missing limbs (5). There is a leaf chewing insect present (2), and the crown is well balanced and quite dense (5). Its life expectancy is 25 years (4).

The sum of the ratings for the six factors is 23, hence it falls into the 80-100% or Excellent condition class.

Example #2. Tree two has a sound and solid trunk (5), but growth rate is less than 1" per year (1). The structure is good except for one major limb being broken (3). There is a leaf disease present (2), and the crown is relatively balanced but thin (3). Life expectancy is 15 years (3).

The total rating of these six factors for tree two is 17, hence it has a classification of 40-60% or Fair condition class.

Example #3. The third tree is split open and hollow (1). Its growth rate is 4" (2). There are two major limbs missing and another with a narrow crotch angle (1). Wood borers and a canker disease are present (1). What little crown does exist is fairly dense, but is very lopsided (2). Life expectancy is 5 years (1).

The ratings for tree three add up to 8, putting this tree into the very poor or 0-20% condition class.

At the outset, the notation that tree condition can be highly subjective was made. This method of using numerical ratings does not claim to eliminate subjectivity, but it has helped reduce it. This method has been an effective training tool for summer forestry students and professional district foresters who may not be familiar with urban tree surveys and judging condition. It is not used to evaluate each tree during a survey, but if for some reason a very precise determination of condition is needed, the method is used. To date, this method has not been tested in court.

Finally, there is considerable variation of opinion as to what factors should be included in condition, and in the relative weight each factor should have. This author realizes that others may modify or add to this system to better fit their needs. However, if those who are interested in a system of quantifying tree condition are aided and stimulated, then the time and effort spent on this method is worthwhile.

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