Florida's Ten Tallest Native Tree Species

by Daniel B. Ward and Robert T. Ing

The Champion Tree data may be just what is needed to supply the "data set" from which to draw calculations.

The Florida Champion Tree Project has now reached the stage where interesting and often useful information may be drawn from the voluminous file of measurements of individual trees. This project, sponsored jointly by the Department of Botany, University of Florida, and the Florida Division of Forestry, has been active in locating and documenting the largest trees of each species throughout the state.

Of the different types of information that can be derived from the champion tree data, we are most intrigued at our capability to answer a question that is rarely asked and has never before been answerable in quantitative terms. This is the seemingly simple question: How tall is Species X, and how does it compare in height with Species Y?

To see the subtlety and inherent difficulty of this question, try rephrasing it this way: How tall is Loblolly Pine (*Pinus taeda*), and how does it compare in height with Flowering Dogwood (*Cornus florida*)? (If you wish, substitute any other two tree species native to Florida.) Obviously — to anyone who knows these trees — the pine is taller than the dogwood. But just how tall is the pine, and how tall the dogwood? And where are the numerical data to back up your answer?

Well, let's see. We can measure all the loblollies in a given area and compare their average height with all the dogwoods in the area. But how do we do that? Do seedlings count? Or do we tabulate only those trees 13 feet tall and above? (The U.S.D.A. Forest Service has defined a "tree" as having a height of "at least 13 feet (4 meters)".) Or perhaps only those old enough to reproduce? And what do we mean by "old enough" — those just big enough, or those actually reproducing? Or should we perhaps measure only the tallest one of each species? But how many hundreds of trees must we measure before we are confident we have the tallest one? Also, with only one tree to represent each species, how can we compute any estimate of variance, that is, how can we calculate whether the observed differences are real or just chance? And finally, who is going to measure all those trees?

Clearly we need a "data set" — some agreed-upon sampling of trees that can be used as the assumed population from which our calculations are drawn. A data set that is already in existence and collected independently of our intended use, thus unbiased. A data set that will permit estimates of variance. And a data set that includes all species.

Well, the champion tree data, collected over a period of more than twenty years, throughout the state, and for most (not quite all) of the native tree species, may be just what we need. We need only to make the assumption that each species is represented at its maximum size by those individual trees nominated as champions. We must acknowledge, of course, that champion trees are nominated on the basis of trunk circumference and crown spread, as well as height, and that it is thus possible there are taller trees in the area that were not selected. And we must also acknowledge that the recorded measurements are perhaps not accurate, and that they may not have been consistently taken by different observers.

But these imperfections in the data set are modest in comparison to those of any other data set that is available, or, indeed, any other data set that we can realistically visualize. Therefore, we are in a position to calculate the mean height and standard deviation for each species and to rank the species in descending order.

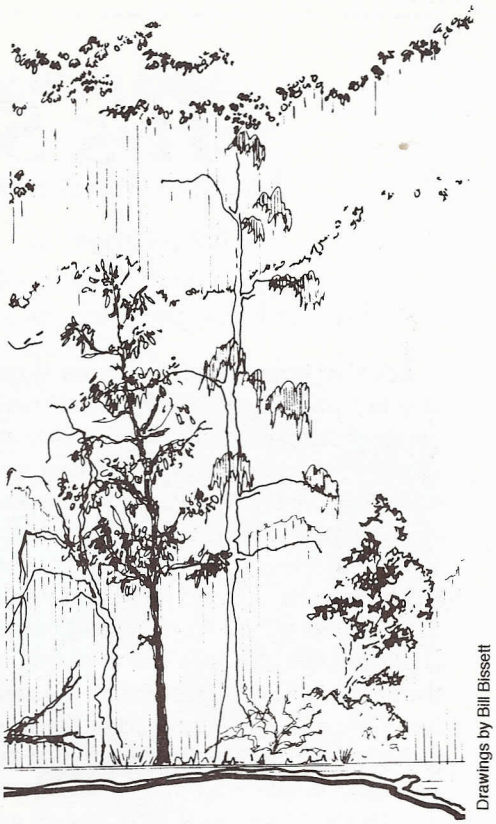
We don't have space here to give the mean heights for all the Florida species, and indeed the ranking changes daily as new records come in. But, as a sample, a listing of the ten tallest species may be of interest.

Loblolly Pine appears to be the tallest tree species in the state, with a mean height (at maximum) of 122.1 feet, based on the 7 trees in the champion files. If we had continued the ranking, we would find Live Oak (*Quercus virginiana*) at rank 41, with a mean height of 81.1 feet, based upon 22 trees. And yes, you were right — loblollies *are* taller than dogwoods; *Cornus florida* doesn't appear until rank 118, with a mean height of 40.3 feet.

But be cautious in accepting these rankings and measurements as absolute values for each species. Note the accompanying standard deviations. The size of the standard deviation is a measure of the variability of the sample; the height measurements of those species with large standard deviations are prob-

The Ten Tallest Native Trees of Florida, Ranked by Mean Height of Champions

Species	Common Name	Mean Height	Number of Trees	Standard Deviation
Pinus taeda L.	Loblolly Pine	122.1	7	16.95
Carya aquatica (Michx. f.) Nutt.	Water Hickory	121.0	3	25.71
Carya cordiformis (Wangenh.) K. Koch	Bitternut Hickory	120.0	1	—
Pinus elliottii Engelm. (var. *elliottii*)	Slash Pine	116.3	7	20.80
Liquidambar styraciflua L.	Sweet Gum	115.6	5	10.90
Ulmus crassifolia Nutt.	Cedar Elm	112.5	2	7.78
Fagus grandifolia Ehrh.	Beech	111.8	5	7.26
Pinus glabra Walt.	Spruce Pine	108.7	3	31.53
Quercus shumardii Buckl.	Shumard Oak	107.0	2	12.73
Liriodendron tulipifera L.	Tulip-tree	106.7	6	18.69



Drawings by Bill Bissett

ably more variable than those with small standard deviations. As a general guide, one may expect the true mean — that is, the average of all the trees that could be nominated as champions — to fall within one standard deviation about two-thirds of the time. Thus, if we were to make a sample of large loblollies many, many times, instead of just once as we have done, we should expect that about two-thirds of the time the average height of these many samples would be within about 17 feet of the 122 feet of our sample, or between 105 and 139 feet in height.

The consequence of this variability, as measured by the standard deviation, is that the height measurements given here, though they seem most precise, are subject to revision with additional sampling. Not only might the values for absolute height be changed, but the relative ranking of the different species might also be changed. But in the words of the statistician, such a sample as we now have is a "best estimate" of the mean height of our tree species and may serve in that capacity until some other, perhaps better, estimate is devised.

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