Site Index
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Site index is a tool to determine the relative productivity of a particular site or location. Site index is the height of a "free to grow" tree of a given species at a base age on the site of interest. Common base ages include 25, 50, and 100, depending on the lifespan and common management practices for that species. Obviously, not all trees are at the base age at the time you measure the tree so curves have been published to convert other ages in to the expected height at the base age. The relationship depends of the observation that height growth is much less affected by variation in density than other measures of tree size such as diameter or volume. It should be noted that tree height growth is effected at very high densities and very low densities, both of these tend to reduce height growth.

Site index is species dependent and must be calculated by species and the value is not usually equivalent between species. Therefore a site index is usually reported as 70 for white oak but this same site may be 75 for shortleaf pine. Some people have published conversion equations but they are not commonly used. A very good source for site index equations for the eastern half of the United States is Carmean et al. (1989).
Site index equations have been constructed in three basic ways and the method of construction effects the interpretation of the results.

1. The oldest method, which was develop prior to the availability of computers to fit the equations, are whole stand average site curves. In this method, researchers collect stand average age and the top height of the stand (the height of the dominant tree in the stand). These observations are plotted on graph paper and "average guide curve" drawn through the points. Then the curve was scaled to go through the known index points. Most of the site index curves created before 1940 were done this way. This method has a strong assumption in that the height averages the top damage contained in the initial stands.

2. The next method attempted to solve the averaging effect of the first method. The researchers collected tree height - age pairs. The trees selected for this method must be dominant or codominant. The curve fitting follows the above methods except the curve are fit with polymorphic equations (this means that each site index curve can have a different shape curve) using statistical packages.

3. The third method and the most common since 1980, is to perform stem analysis on individual trees and fit curves to the growth pattern of individual trees.

Selection of Site trees
Selection of suitable site trees is important to determine site index. Site tree are free growing, uninjured, dominant and codominant trees. Past management practice can influence the above characteristics. Tree ages closer to the base age will yield more accurate estimates of site index. The ages should not vary more that 10-year. Normally, between 5 and 10 site trees are taken to estimate on site index to account for normal variation between trees.

References
Carmean, W. H., J. T. Hahn, and R. D. Jacobs. Site index curves for forest tree species in the Eastern United States. General Technical Report NC-128, USDA Forest Service, North Central Forest Experiment Station, 1989.

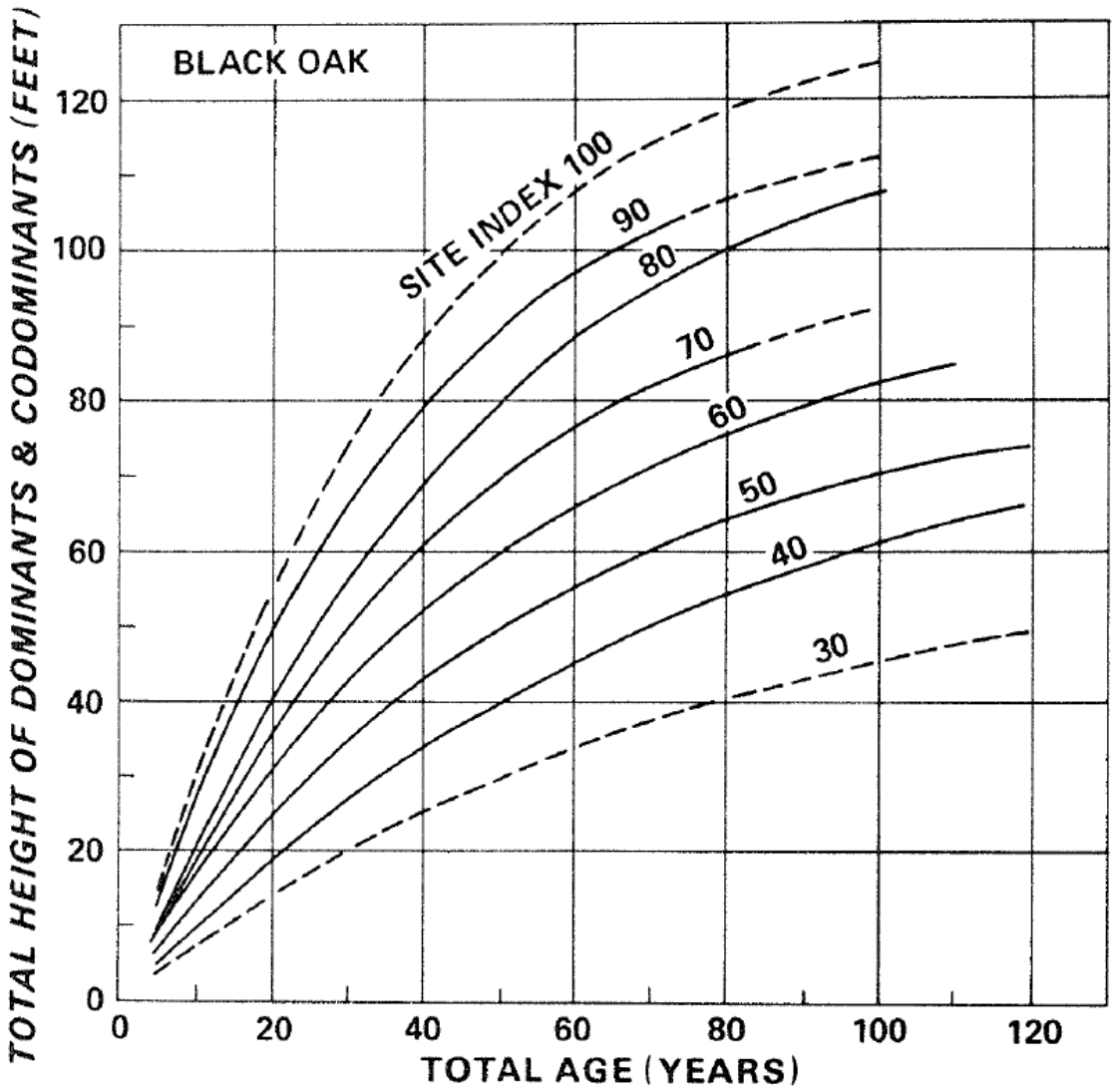

Figure 1. — *Site index curves for black oak in the Central States. These curves are based on stem analyses of 300 dominant and codominant black oaks growing on 120 plots located in the unglaciated portions of southeastern Ohio, eastern Kentucky, southern Indiana, southern Illinois, and southern Missouri (Carmean 1971).*

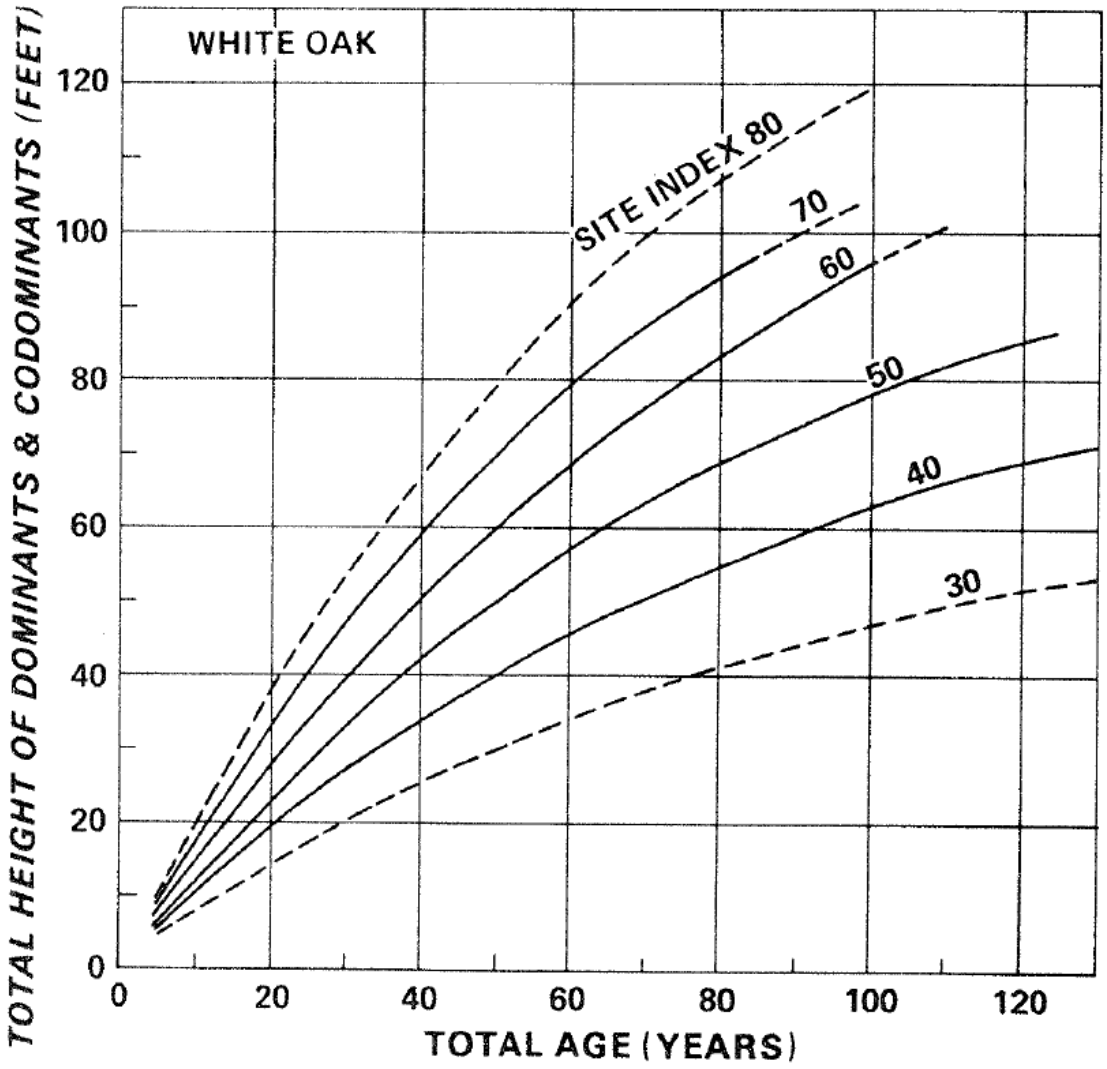

Figure 2. — *Site index curves for white oak in the Central States. These curves are based on stem analyses of 112 dominant and codominant white oaks growing on 41 plots located in the unglaciated portions of southeastern Ohio, eastern Kentucky, southern Indiana, southern Illinois, and southern Missouri (Carmean 1971).*

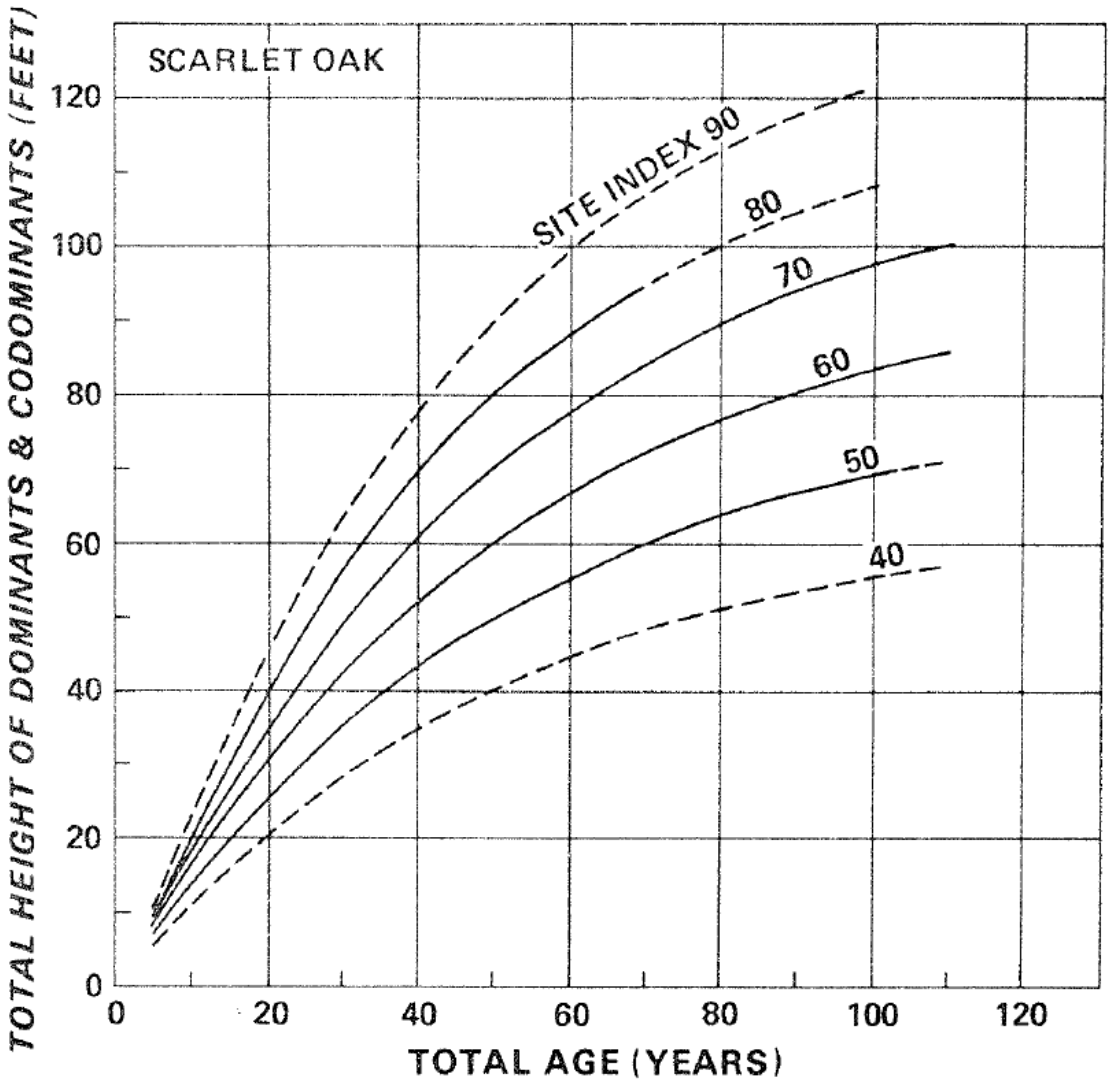

Figure 3. — *Site index curves for scarlet oak in the Central States. These curves are based on stem analyses of 88 dominant and codominant scarlet oaks growing on 25 plots located in the unglaciated portions of southeastern Ohio, eastern Kentucky, southern Illinois, and southern Missouri (Carmean 1971).*

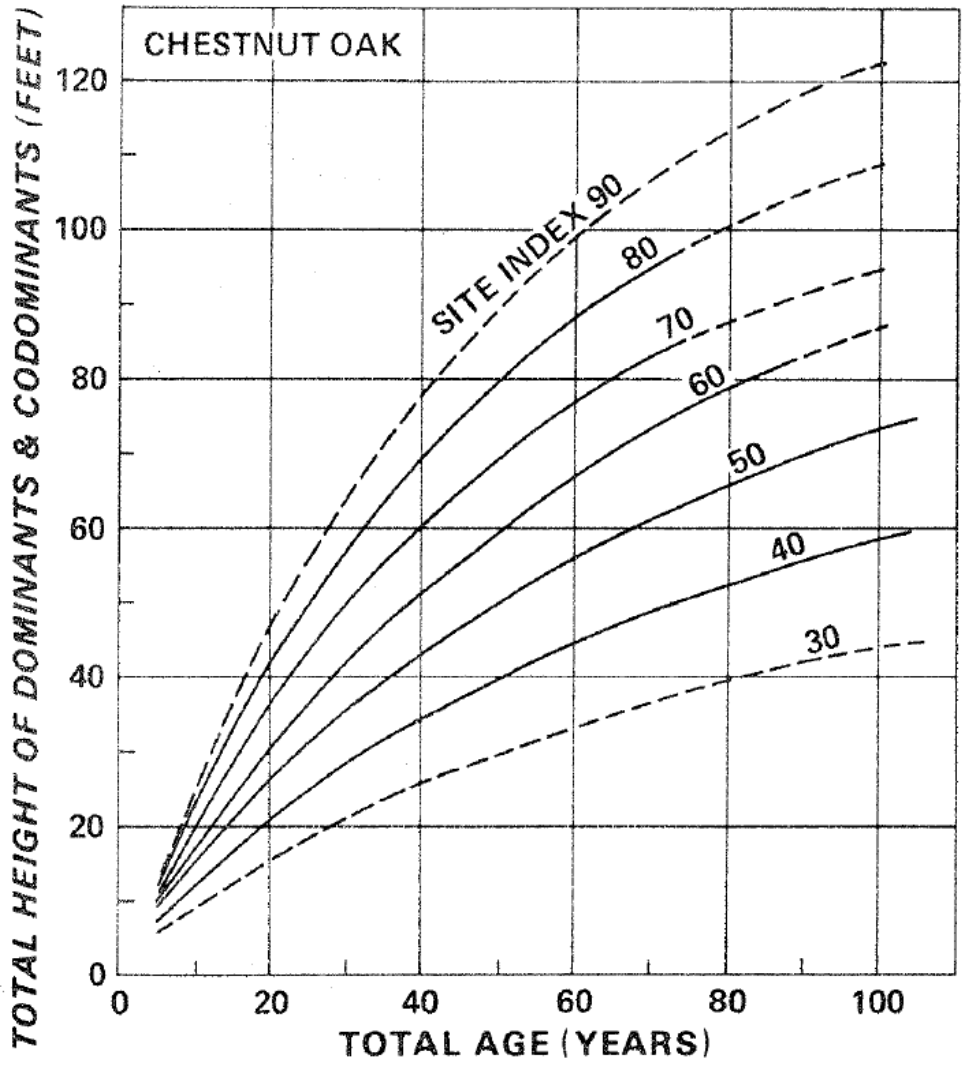

Figure 4. — *Site index curves for chestnut oak in the Central States. These curves are based on stem analyses of 59 dominant and codominant chestnut oaks growing on 18 plots located in the unglaciated portions of southeastern Ohio, eastern Kentucky, and southern Indiana (Carmean 1971).*

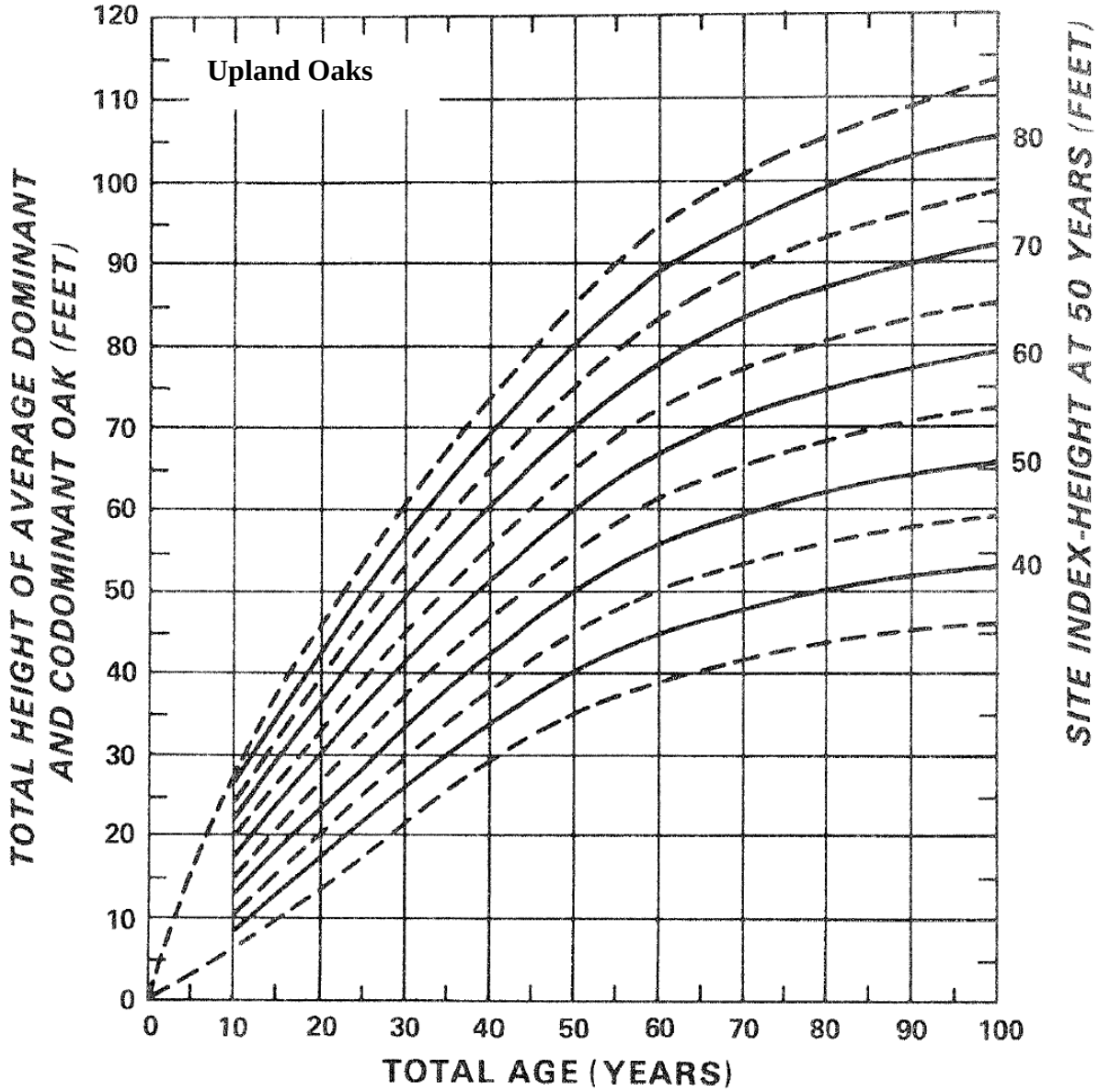

Figure 5. — *Site index curves for upland oak (Schnur 1937).*

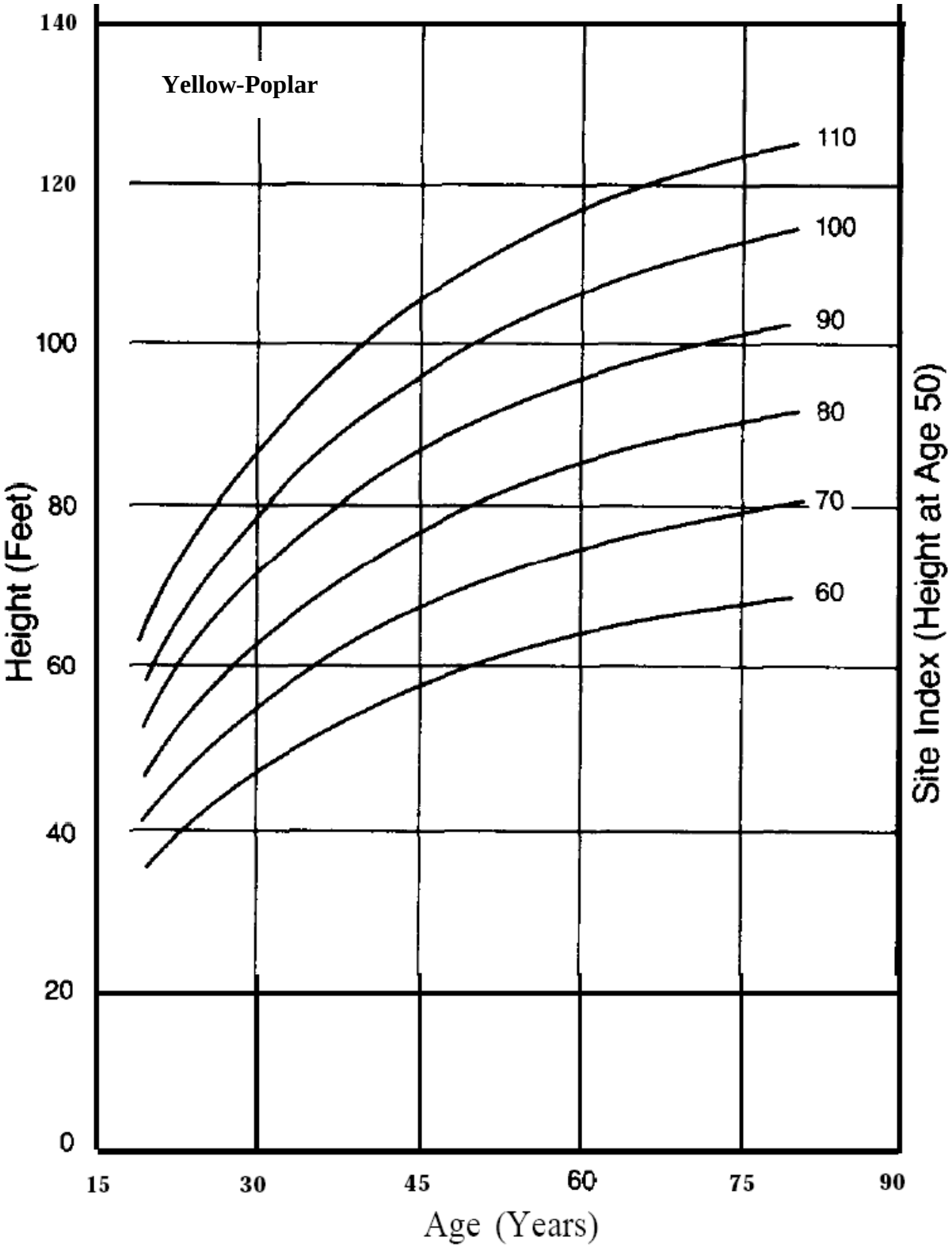

Figure 6. Site Index curves for West Virginia yellow-poplar (Adapted from Schlaegel and others 1969)

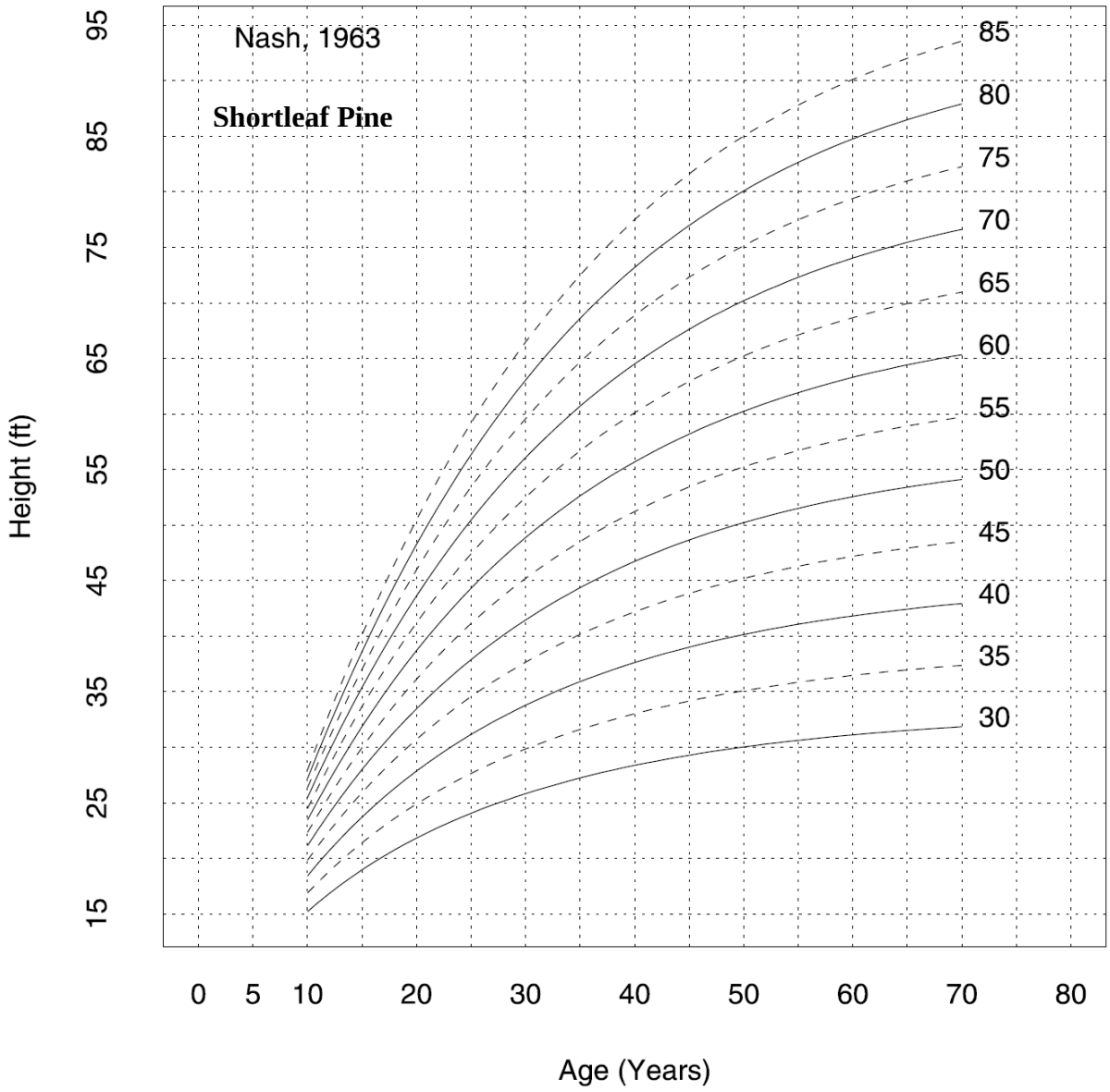

Figure 7. Site Index curves for shortleaf pine (Nash 1963)