Age extrapolation from incomplete increment cores

(OR, one way to estimate total age when the borer is shorter than tree radius)

Measured values at breast height:

DBH = Diameter Breast Height (in.)

BT = Bark Thickness (in.) (should be an average)

L_c = Length of measureable increment core (in.)

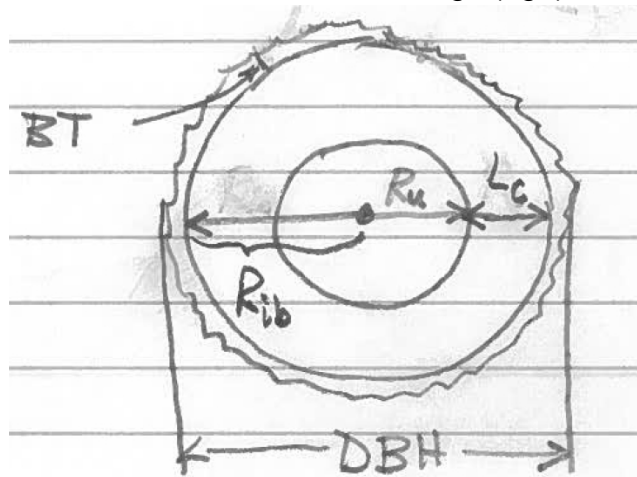N_c = Number of counted rings (age) in cored length, L_c

Figure 1. Schematic diagram of the situation at hand.

Other derived variable definitions:

R_{ib} = Radius inside bark (in.) of tree

A_T = Total Area inside bark of tree at breast height (sq.ft)

R_u = Radius of unfathomed tree center (in.)

A_u = Area of unfathomed tree center (sq.ft)

A_c = Area of outside "donut" that cored length represents (sq.ft)

N_u = Number of uncounted rings remaining in unfathomed tree center (estimated)

N_T = Total number of rings (age in yr.) of tree at breast height (to be estimated)

Math:

R_{ib} = ½ DBH − BT

R_u = R_{ib} - L_c

A_T = π [R_{ib} / 12]^2

A_u = π [(R_{ib} − L_c) / 12]^2

A_c = A_T − A_u

Assumption: Annual basal area growth is fairly constant, therefore

$N_u / A_u = N_c / A_c$

Thus,

$N_u = A_u (N_c / A_c)$

Now, since,

$N_T = N_c + N_u$,

Then,

$N_T = N_c + A_u (N_c / A_c)$

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