

# Diameter Growth Equations for CONUS

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## Fit Diameter Growth Equations (no site index)

### Preliminary CONUS-wide Diameter Growth Equation

We built a data set from Forest Inventory and Analysis (FIA) remeasurement data, filtering out observations with missing values for diameter at breast height (`dbh`), basal area in larger trees (`bal`), crown ratio (`cr`), total height (`ht`) and site index (`si`), and remeasurement intervals less than 5 years. We also restricted the data to species with  $\geq 5000$  observations.

It should be noted that site quality is not included in this modeling effort and will need to be introduced once a uniform CONUS-wide productivity measure is derived.

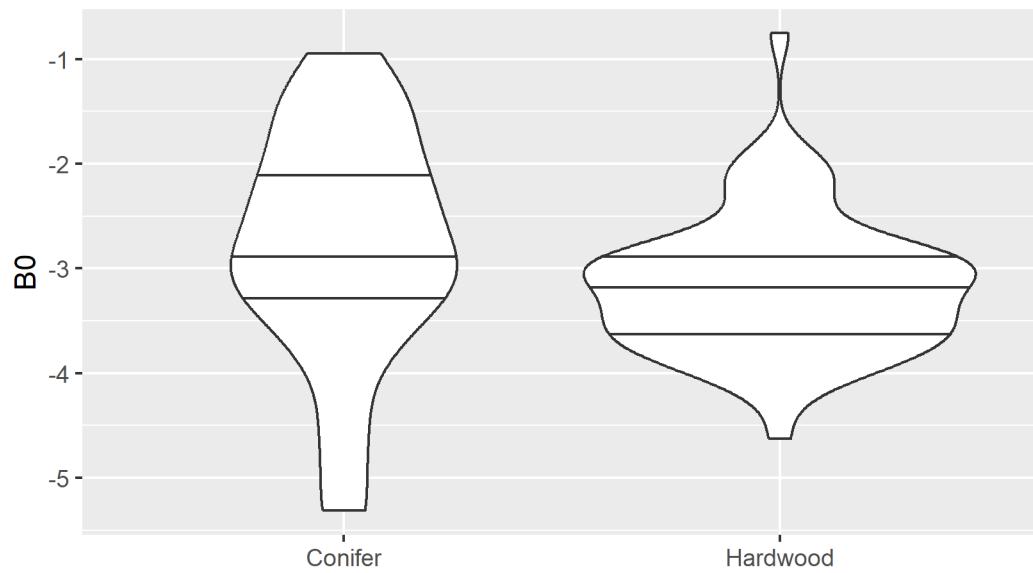
The diameter growth equation fit to these data was:

$$\Delta dbh = e^{(\beta_0 + \beta_1 \log(\frac{(dbh+1)^2}{(cr*ht+1)^{\beta_4}}) + \beta_2 \frac{bal^{\beta_5}}{dbh+2.7})} \quad (1)$$

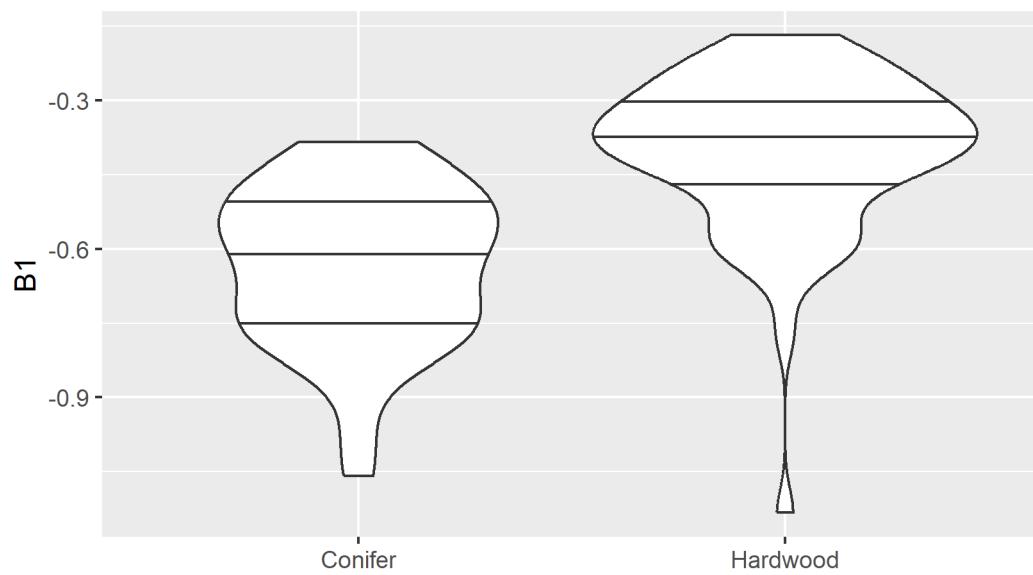
Equation 1 was fit to each qualifying species using an integrated fitting approach and errors minimized were ending `dbh`. 98 species equations were estimated. Sample sizes ranged from 5199 to 382805 observations.

The graphs below show the range of parameter estimates divided into Conifer and Hardwood groups. The parameter estimates are remarkable stable across species.

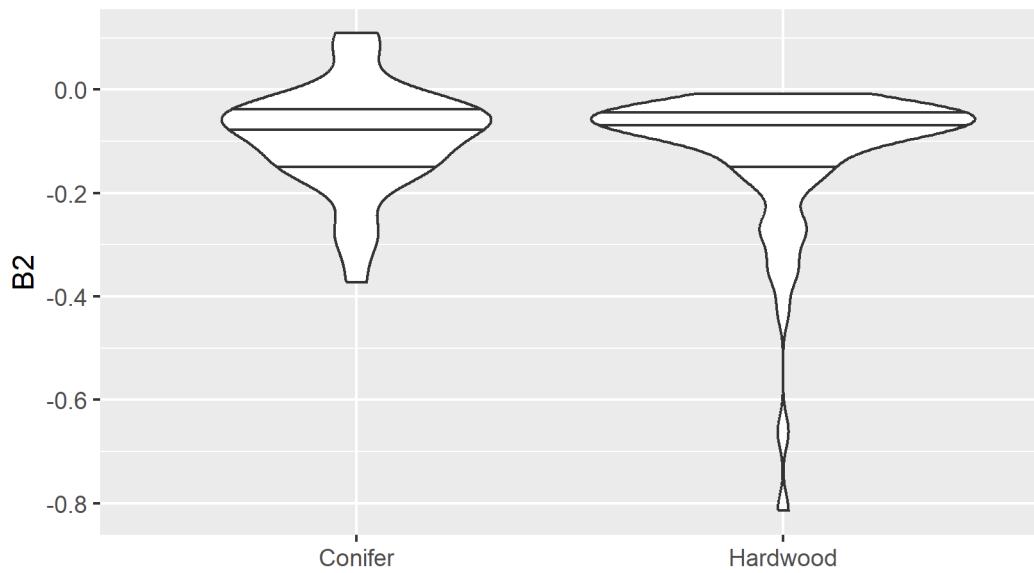
Sets Approximate Minimum DG



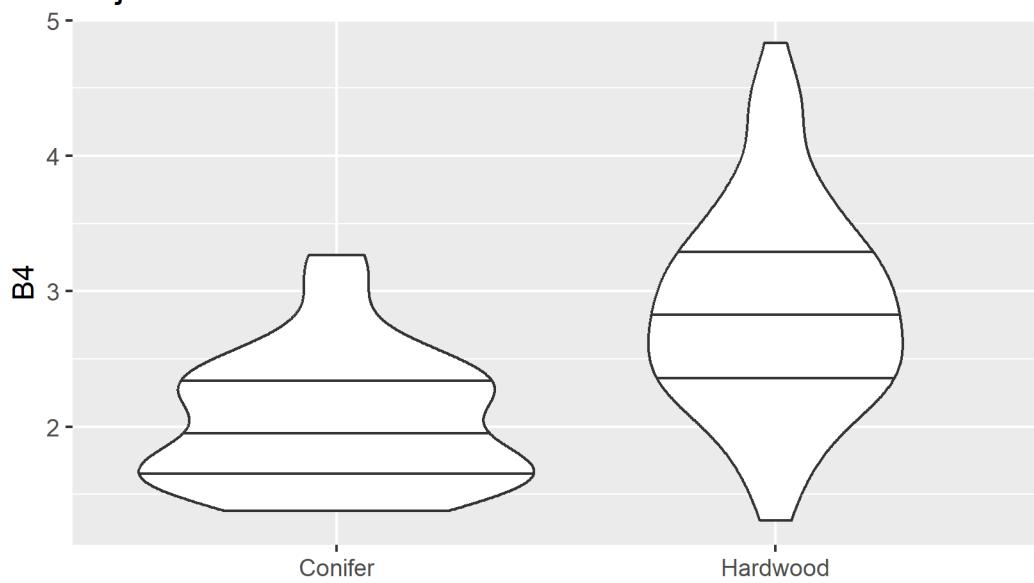
Sensitivity to Tree Size Relative to Crown



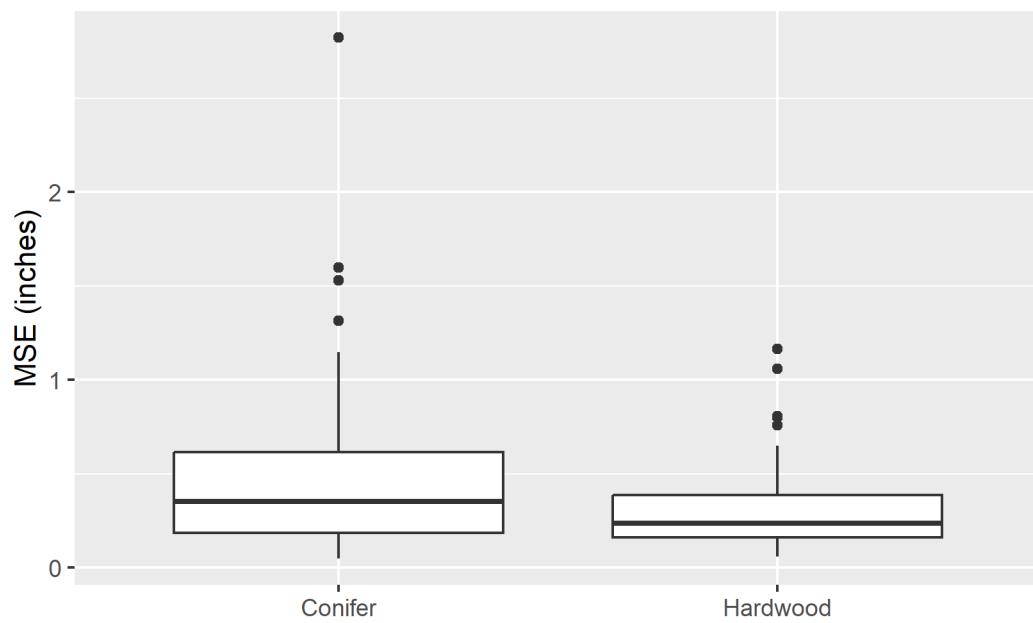
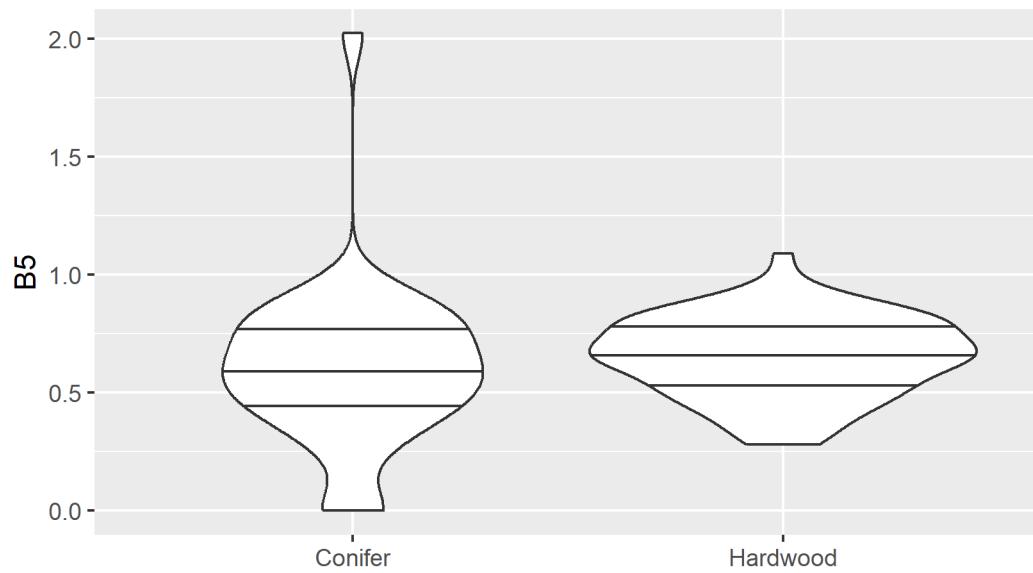
### Sensitivity to Basal Area in Larger Trees Relative to DBH



### Adjusts Crown Effects



### Adjusts Basal Area in Larger Trees Effects



## FIA Species Clusters by Alternative Diameter Growth Parameter E<sub>1</sub>

