

Progress Report

The effects of dominant tree height definition on loblolly pine growth and yield model outputs in the southeast U.S.

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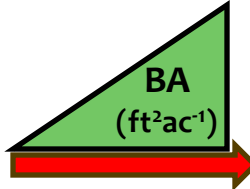
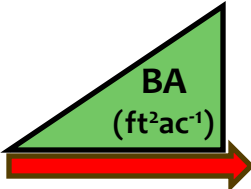


Project Overview

- ❑ ISSUE: No **single designated definition** for dominant tree height in the southeast U.S. (or internationally)
- ❑ INVESTIGATION: Since **dominant height** and **site index** are used as variables in **Growth & Yield Models**, examine the impacts on a model's (i.e., PMRC 1996) outputs
- ❑ DEFINITIONS EVALUATED (total of 19): **Dominant & Codominant** crown classes (**DC**), DBH > **Mean Diameter (MD)**, DBH > **Quadratic Mean Diameter (QMD)**, Best **Sawtimber** potential class (**ST**), 10-50% **Largest DBH (LD**P)**, 20-60 **Largest DBH TPA (LD**)**, 20-60 **Tallest TPA (TT**)**
- ❑ WHY: Growth and yield model outputs **guide silvicultural management** and **timberland investment decisions**



Current Progress

- Avg. largest differences in Ht_{dom} estimations: 3.4  6.4 ft
- How often Ht_{dom} distribution were sign. different: 28  68%
- Some definitions appear to be more sensitive to silvicultural treatments (i.e., thinnings)
- Chapman-Richards site index model's performance impacted
 - e.g., tallest tree definitions yielded the highest RMSEs on avg.



Current Progress

PMRC 1996 Growth & Yield Model (Basal Area Function)

$$\ln(BA_2) = \ln(BA_1) - B_1 \left[\frac{1}{A_1} - \frac{1}{A_2} \right] + B_2 [\ln(TPA_2) - \ln(TPA_1)] + B_3 [\ln(HD_2) - \ln(HD_1)] + B_4 \left[\frac{\ln(TPA_2)}{A_2} - \frac{\ln(TPA_1)}{A_1} \right] + B_5 \left[\frac{\ln(HD_2)}{A_2} - \frac{\ln(HD_1)}{A_1} \right]$$

Mid-rotation Treatment (Non-Thinned)

Projection: 15 → 25 yrs

Highest (ft²ac⁻¹): (DC/ST)

▪ PIE/UCP: **221.6** | **229.2**

▪ LCP: **185.5** | **190.7**

Lowest (ft²ac⁻¹): (TT)**

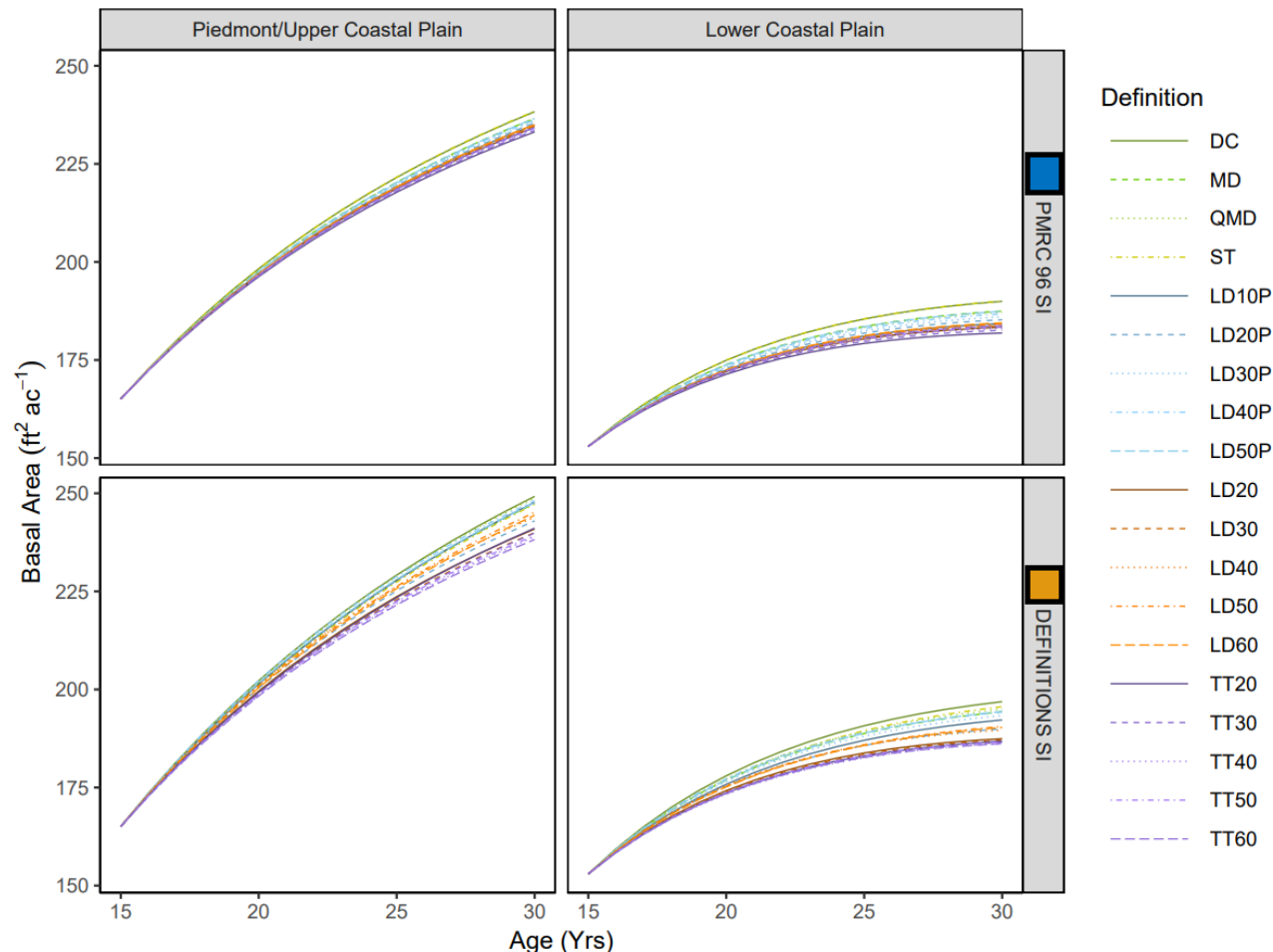
▪ PIE/UCP: **217.8** | **221.5**

▪ LCP: **179.2** | **182.6**

Largest Difference (ft²ac⁻¹)

▪ PIE/UCP: **3.8** | **7.6**

▪ LCP: **6.3** | **8.2**



Future Plans

- ❑ Evaluate the **impacts** on projected **Green Weight** & **Merchantable Product Classes**
- ❑ **Repeat Simulations** with **Thinning** (90, 70, & 50 ft² ac⁻¹) and **Thinning+Fertilization**
- ❑ **Rank definitions** based on **fit statistics** and **characteristics**
- ❑ Assess the **impact** on **rotation age for maximizing economic returns** between the best definition(s) and worst(s)
- ❑ **Finish-up thesis** and **submit a publication** (~Spring/Summer 2024)

