

Supplemental Materials S2. Model form and fit statistics for each of the equations used in the analysis.

Equation	Model form	R ²		Mean bias (obs. – pred.)	RMSE
		Fixed only	Fixed + random		
Total height (Eqn.)	$HT = \left((b_{10} + \gamma_i + \delta_{ij}) + b_{11} \cdot BAL + b_{12} \cdot BA \right) \cdot \exp(-b_{13} \cdot DBH^{b_{14}})$	96.11	97.09	0.0042	0.8854
Height to crown base	$HCB = \frac{HT}{\left(1 + \exp \left((b_{20} + \gamma_i + \delta_{ij}) + b_{21} \cdot HT + b_{22} \cdot BAL + b_{23} \cdot \ln(BA) + b_{24} \cdot \left(\frac{DBH}{HT} \right) \right) \right)}$	89.77	94.31	-0.0261	0.8687
Diameter increment	$\Delta DBH = \exp \left((b_{30} + \gamma_i + \delta_{ij}) + b_{31} \cdot DBH + b_{32} \cdot DBH^2 + b_{33} \cdot \ln \left(\frac{CR + 0.2}{1.2} \right) + b_{34} \cdot \ln(SI - 1.37) + b_{35} \cdot \ln \left(\frac{DBH}{QMD} \right) + b_{36} \cdot \sqrt{BA} \right)$	65.85	76.56	-0.0011	0.2334
Height increment	$\Delta HT = PHT \cdot \left(\left(\frac{HT}{HT_{100}} \right)^{(b_{40} + \gamma_i + \delta_{ij})} \cdot \left(1 - \left(b_{41} \cdot \left(\frac{CCF}{600} \right) \right)^{b_{42}} \right) \right)$	61.89	66.07	0.0063	0.2165
Height to crown base increment	$\Delta HCB = \frac{(CL + \Delta HT)}{\left(1 + \exp \left((b_{50} + \gamma_i + \delta_{ij}) + b_{51} \cdot \ln(CR) + b_{52} \cdot CR + b_{53} \cdot GEA + b_{54} \cdot \ln(BA) + b_{55} \cdot \left(\frac{CR}{BA} \right) \right) \right)}$	65.74	76.58	0.0002	0.2197
Mortality ¹	$\text{logit}(p.\text{surv}) = b_{60} + b_{61} \cdot DBH + b_{62} \cdot SI + b_{63} \cdot \left(1 - \frac{DBH}{DQ} \right) + b_{64} \cdot BA$	-	-	-	-
Dominant height ²	$HD_2 = \frac{AGE_2^2}{b_{70} + AGE_2 \cdot \left(\frac{AGE_1}{HD_1} - b_{71} \cdot AGE_1 - \frac{b_{70}}{AGE_1} + b_{71} \cdot AGE_2 \right)}$	0.991	-	-	0.7173

¹Mortality model fitted to expanded dataset including tree without HT or HCB measurements (n=74,239 period observations). ²Dominant height fitted to all possible combinations of measurement periods that were strictly increasing in age (n=2890). HD₁ and HD₂ were starting and ending dominant heights, respectively, between two measurement periods with corresponding ages, AGE₁ and AGE₂.