Imputation of Missing Heights for a National Forest Inventory System

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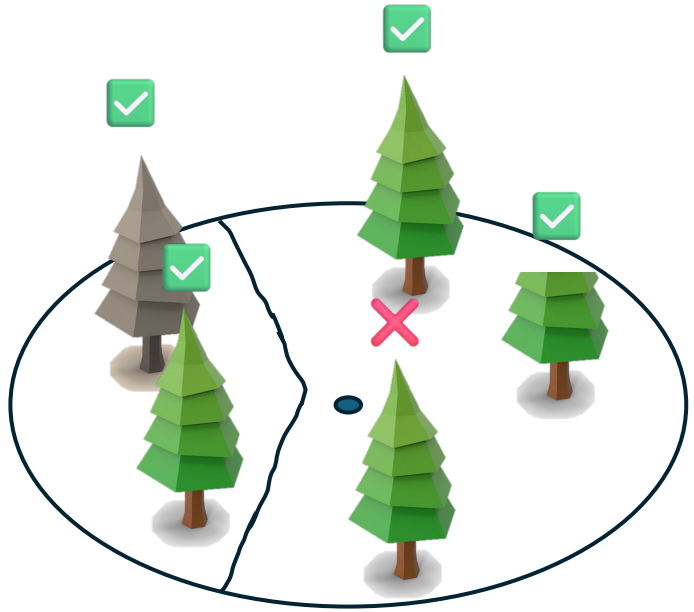
Outline

- Growth Sample Trees – CA / OR / WA
- Existing Imputation System
- Avenues for Revision
- Feedback

Growth Sample Trees (GSTs)

- GST: a tree we measured for height
- Define the bin
  - Species x Condition x D. Class
- Clockwise from north, the first tree in the bin is a GST
- If broken, the next tree is a GST, etc.
- All standing dead are GSTs



Assume
- two conditions
- same species
- same diameters

Growth Sample Trees (GSTs)

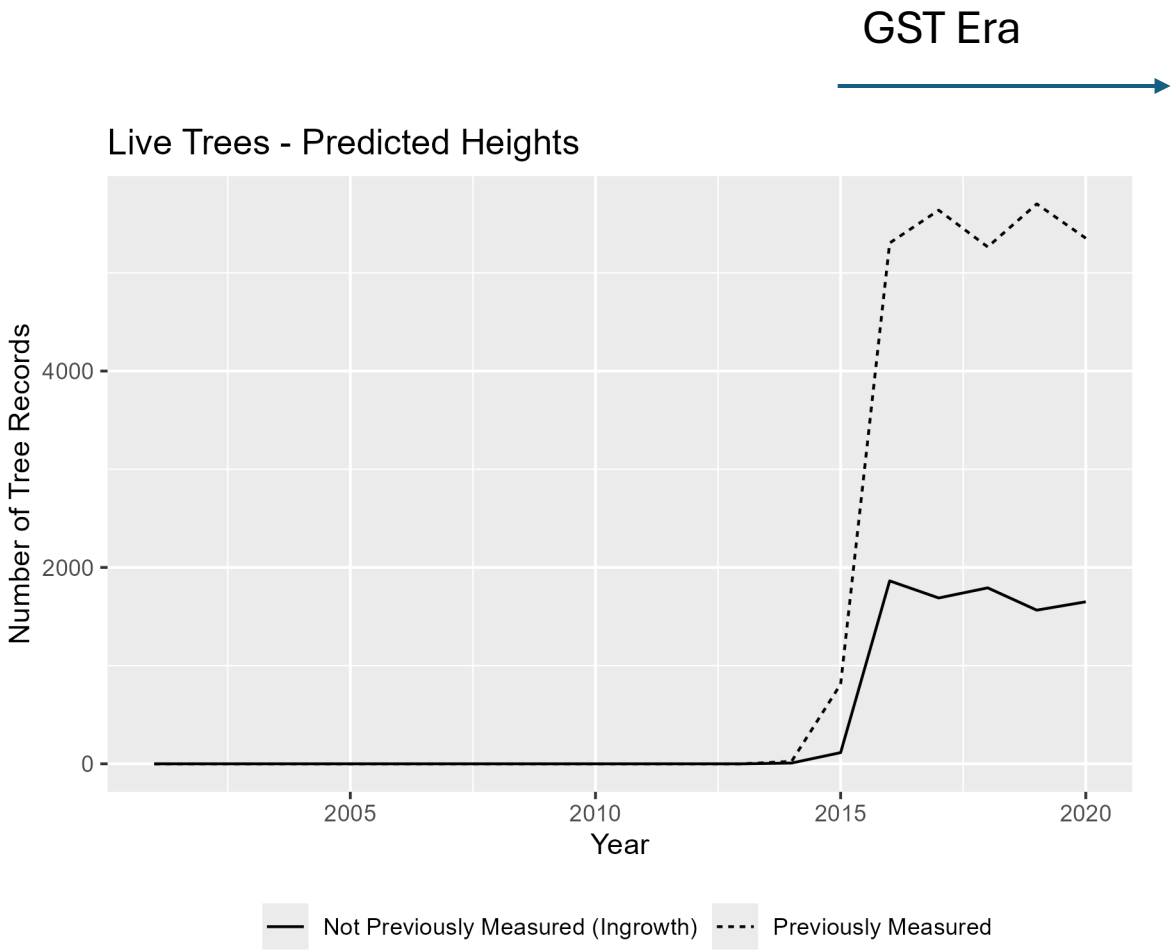
- Let’s inspect the sets we make using this procedure
  - GST

  - NGST

- GSTs tend to be “odd” trees
- while NGSTs tend to be “nice” trees -> easy to predict

Growth Sample Trees (GSTs)

- Predicted heights on live trees rapidly increase c. 2015
- Two cases
  - Remeasured trees
  - But also new trees!
- A height prediction system must address both cases



Existing Imputation System

- NGSTs are predicted using one of two approaches
  - New Trees
    - $\hat{h}_t = \hat{f}(d_t)$
  - Remeasured Trees*
    - $\hat{h}_t = h_{t-1} + \hat{f}(d_t) - \hat{f}(d_{t-1})$
  - $\hat{f}$ refers to a model fit from Barrett (2006)
- ***The Barrett System***

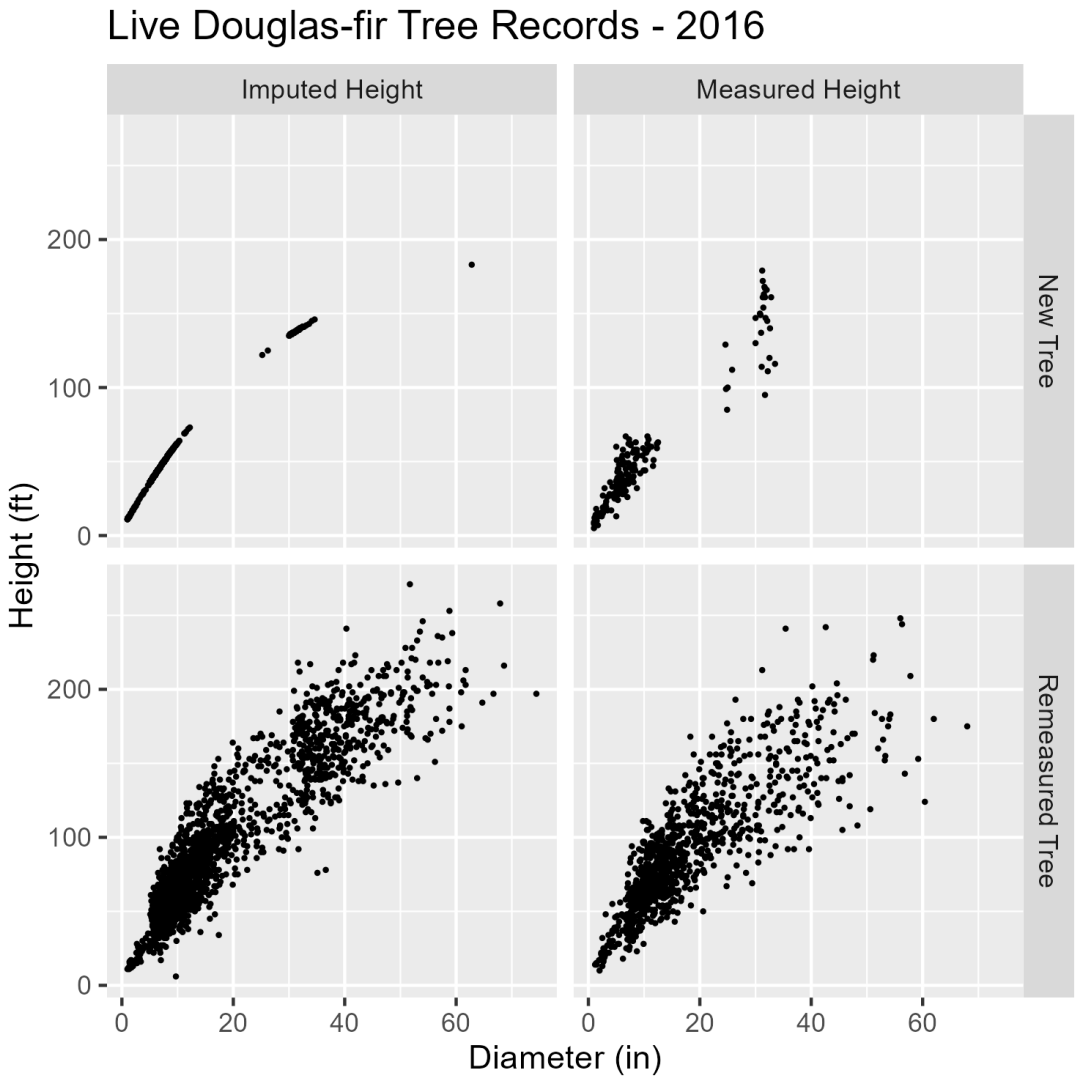
*Not the actual function used, but a useful illustration

Avenues for Revision

- Height imputation should be simple
  - Once per year on large databases
  - Staff without biometrics training
- SQL is desirable
  - Automatic
  - Easy to add into existing queries (e.g., recalculating biomass)

Feedback

- Some imputed data compress variability
  - How can this be resolved?
  - How important is it?
- Imputed data are erroneous
  - How best can FIA deliver imputed data to you?



Feeback

- What would make you most comfortable using imputed data?
  - Access to residual variance estimates?
  - Access to imputation system itself?
  - Database architecture?
  - Documentation?

References

Barrett, T M. “Optimizing Efficiency of Height Modeling for Extensive Forest Inventories.” *Canadian Journal of Forest Research* 36, no. 9 (September 2006): 2259–69. https://doi.org/10.1139/x06-128.