

Using 3-PG_{lob} Model to Predict Southeastern Region *Pinus taeda* (loblolly pine) Productivity



Ying Wang & Robert O. Teskey
Warnell School of Forest Resources, University of Georgia



ABSTRACT

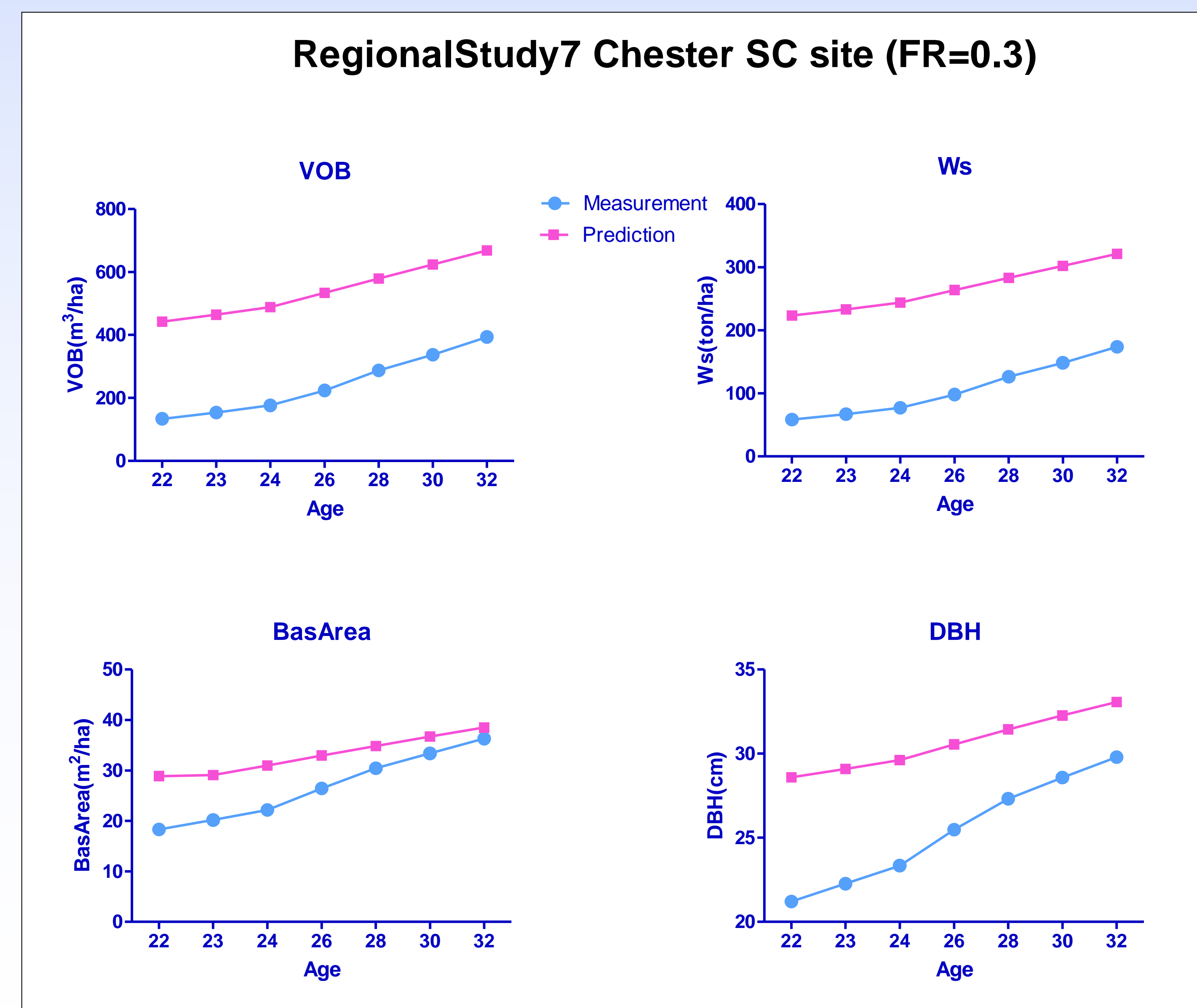
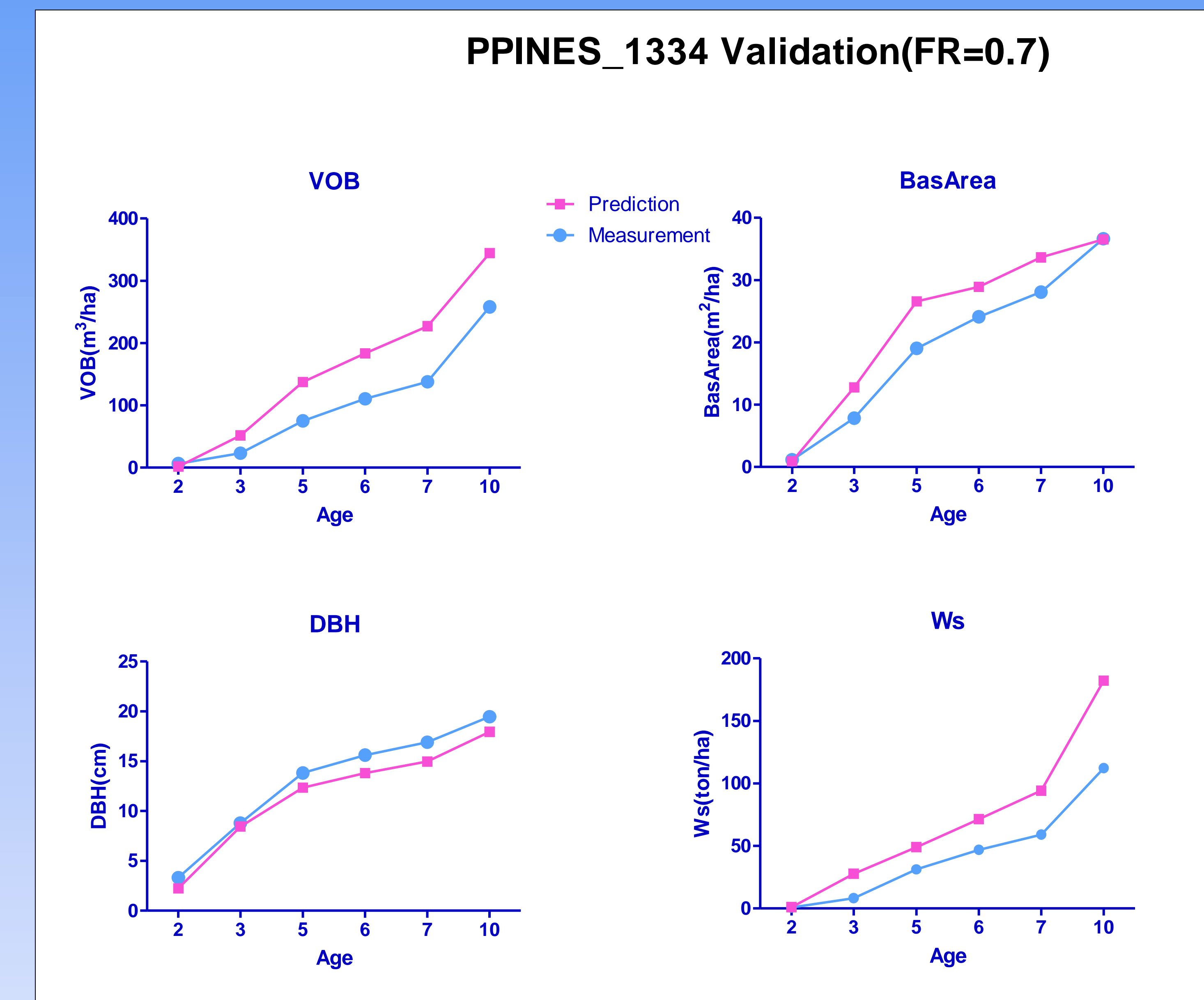
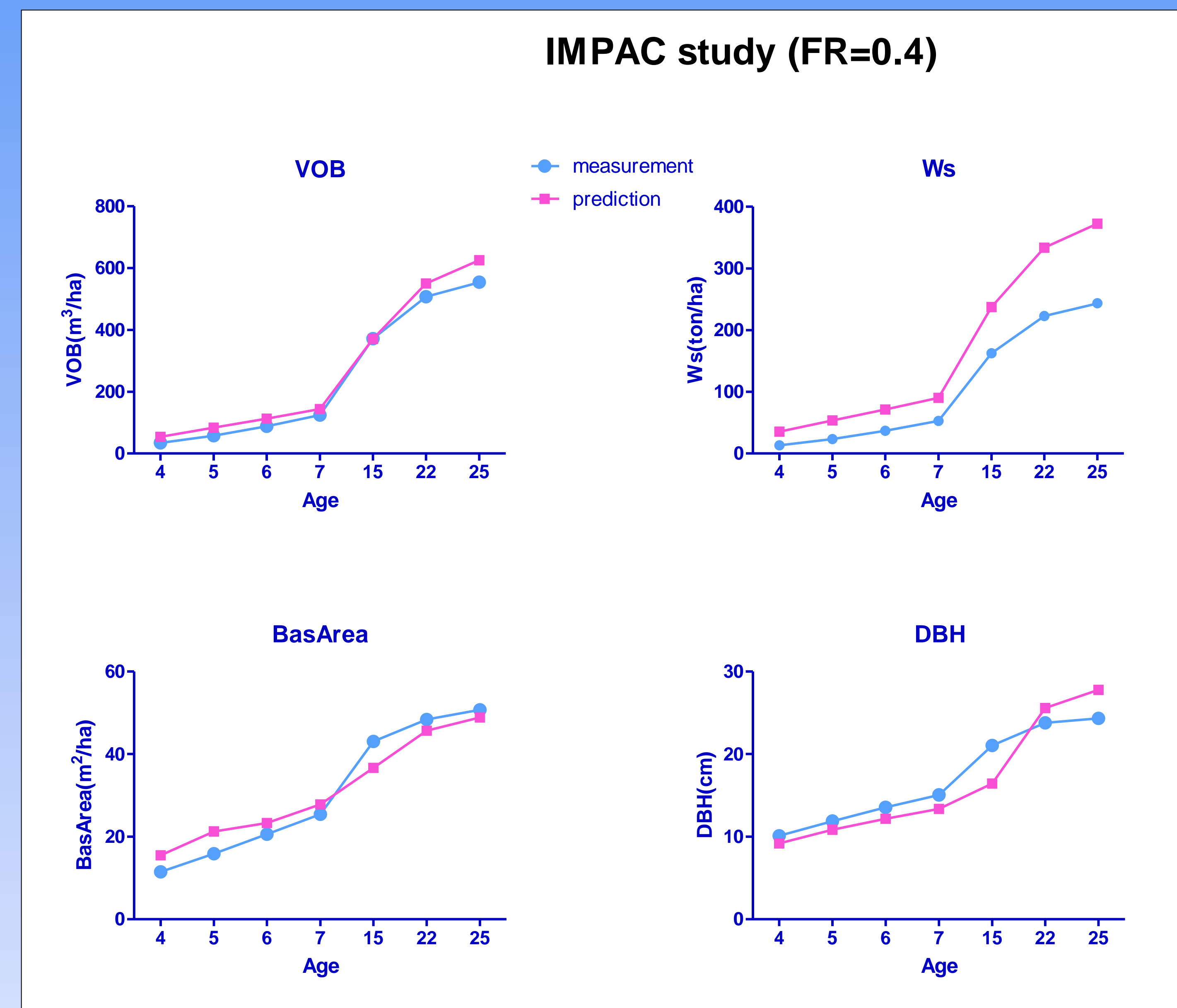
A series of loblolly pine productivity simulations were conducted for the southeastern region's plantations by using 3-PG_{lob} model. We have hypothesized that we can accurately apply the same set of the physiological parameters across a wide range of sites (loblolly pine plantations), by incorporating each location's climate and soil conditions. This set of physiological parameters has been derived from a highly productivity site in Waycross, GA. Based on this set of parameters and respective soil and climate data, the model simulation outputs were validated for three studies: PPINES, IMPAC and RegionalStudy7. The model performed well on the PPINES and IMPAC study sites. It can accurately predict the stand basal area (BasArea), DBH, volume outside of the bark (VOB) and stem biomass (Ws). However for the Regional Study 7 sites, the model doesn't have a good fitting between the measurements and model predictions. The inaccuracy of the model prediction on this study may be attributed to unclear fertilization situation, since the model's outputs are highly sensitive to the fertility rating (FR). From our preliminary results, it was concluded that additional information will be needed for the regional study7 sites to allow for better analysis in the future.

METHODS

A set of physiological parameters was used for all the study sites with respective climate and soil conditions. The model outputs were then compared to the site measurements for VOB, Ws, BasArea and DBH. Fertility rating (FR) parameter was adjusted based on the comparison of the site fertilization and original site fertilization where it was used to develop that set of physiological parameters. The validated sites were all in the following states: AL, FL, GA, NC and SC.



RESULTS



CONCLUSIONS

- 3-PG_{lob} model predicts the DBH, VOB and BasArea the most accurate for the IMPAC and PPINES study sites
- 3-PG_{lob} predicts Ws relatively accurate on the IMPAC and PPINES study sites
- 3-PG_{lob} can't predict RegionalStudy7 sites productivities for all 4 outputs.
- More details about RegionalStudy7 sites are needed for the model calibration
- Additional study sites in the other southern states are needed in order to cover the whole southeastern region's loblolly pine productivity

Reference

Miles, P. D. and Smith, W. B. (2009) Specific gravity and other properties of wood and bark for 156 tree species found in North America. Research note NRS-38