

Progress Report

Using predictive analytics to decompose site index

CAFS 20.83

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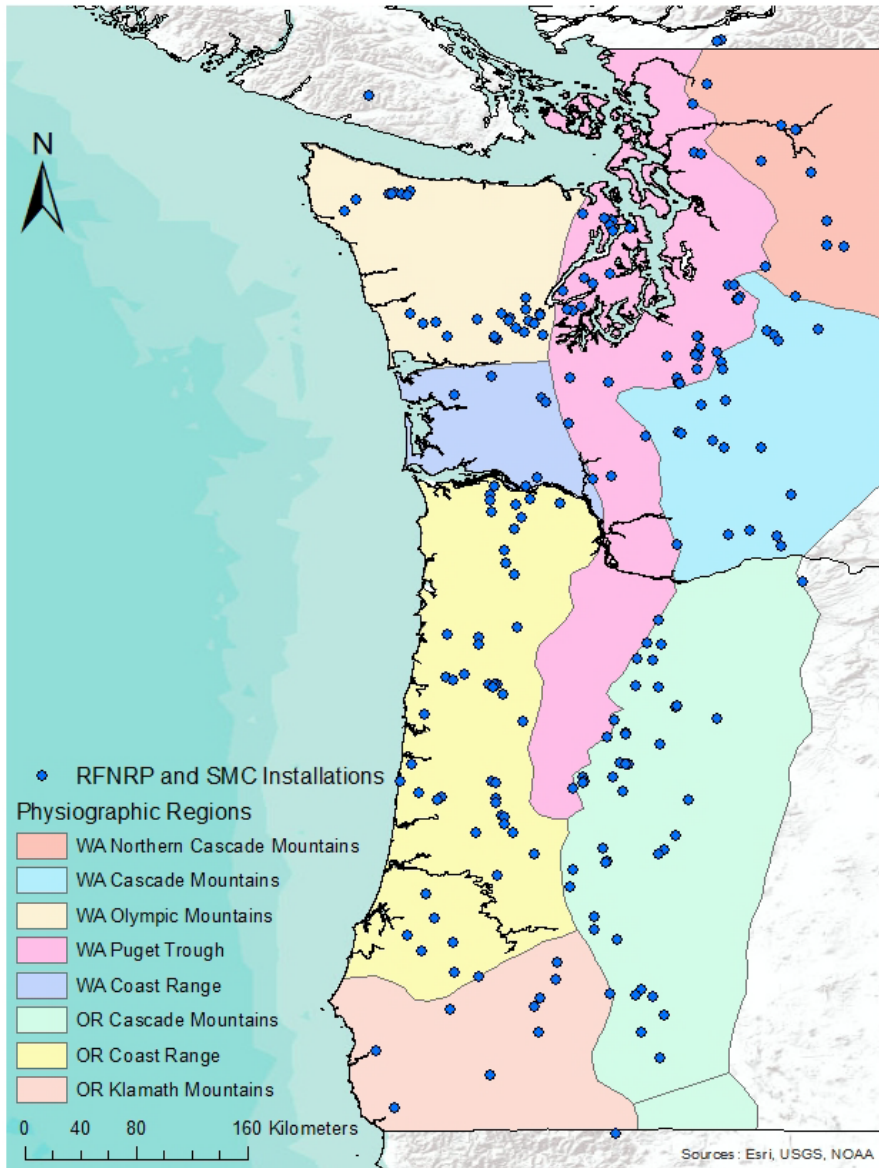
Project Overview

Summary of data sources

<u>Project</u>	<u>Description</u>	<u>Plots</u>
RFNRP I	Unthinned natural stands DF	89
RFNRP II	Thinned natural stands DF	39
RFNRP III	Young, thinned, and low-site DF	22
RFNRP IV	PCT, low-stocked planted DF	26
SMC I	Multiple thinnings of young DF	91
SMC II	Thinning middle aged DF	12
SMC III	Planted spacing trials of DF	127

¹ RFNRP: Regional Forest Nutrition Research Project

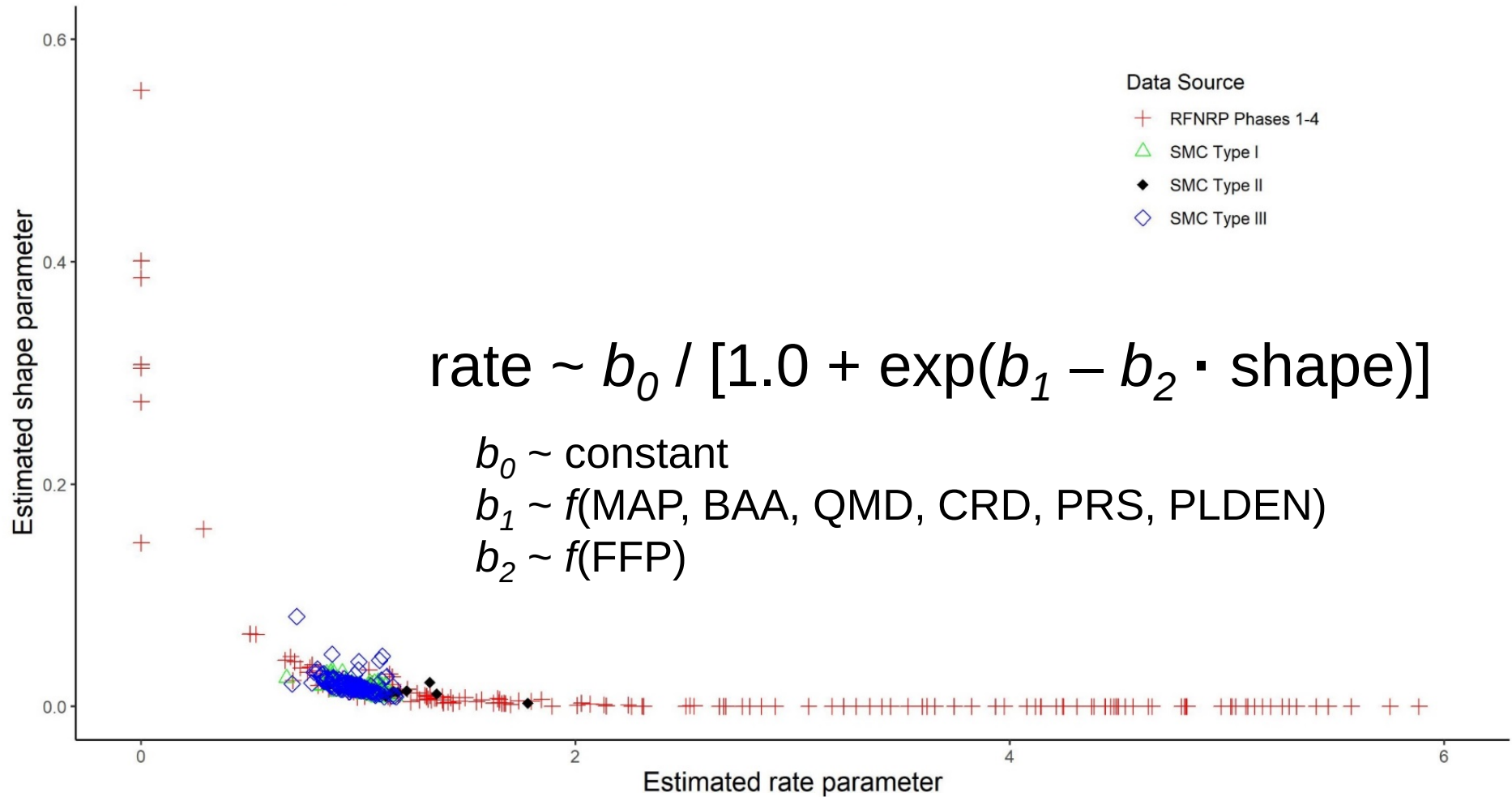
² SMC: Stand Management Cooperative



Current Progress

Fitted pairs of rate and shape parameters with a constrained asymptote

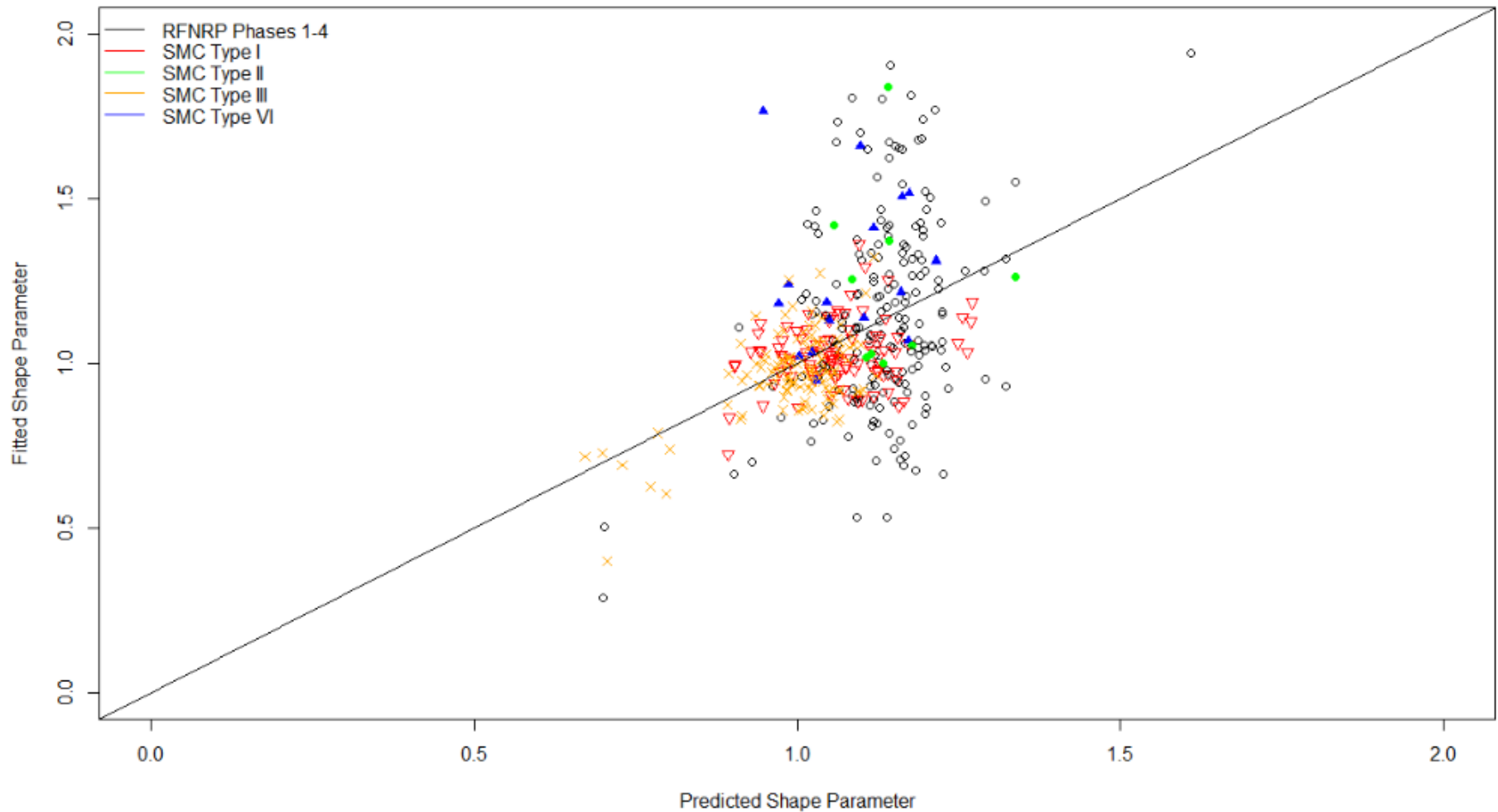
Model form: $H40 \sim asymptote * (1 - \exp(rate * (BHAGE^{**}shape)))$; $n = 406$



Current Progress

Fitted and Predicted Shape Parameter Values by Data Source

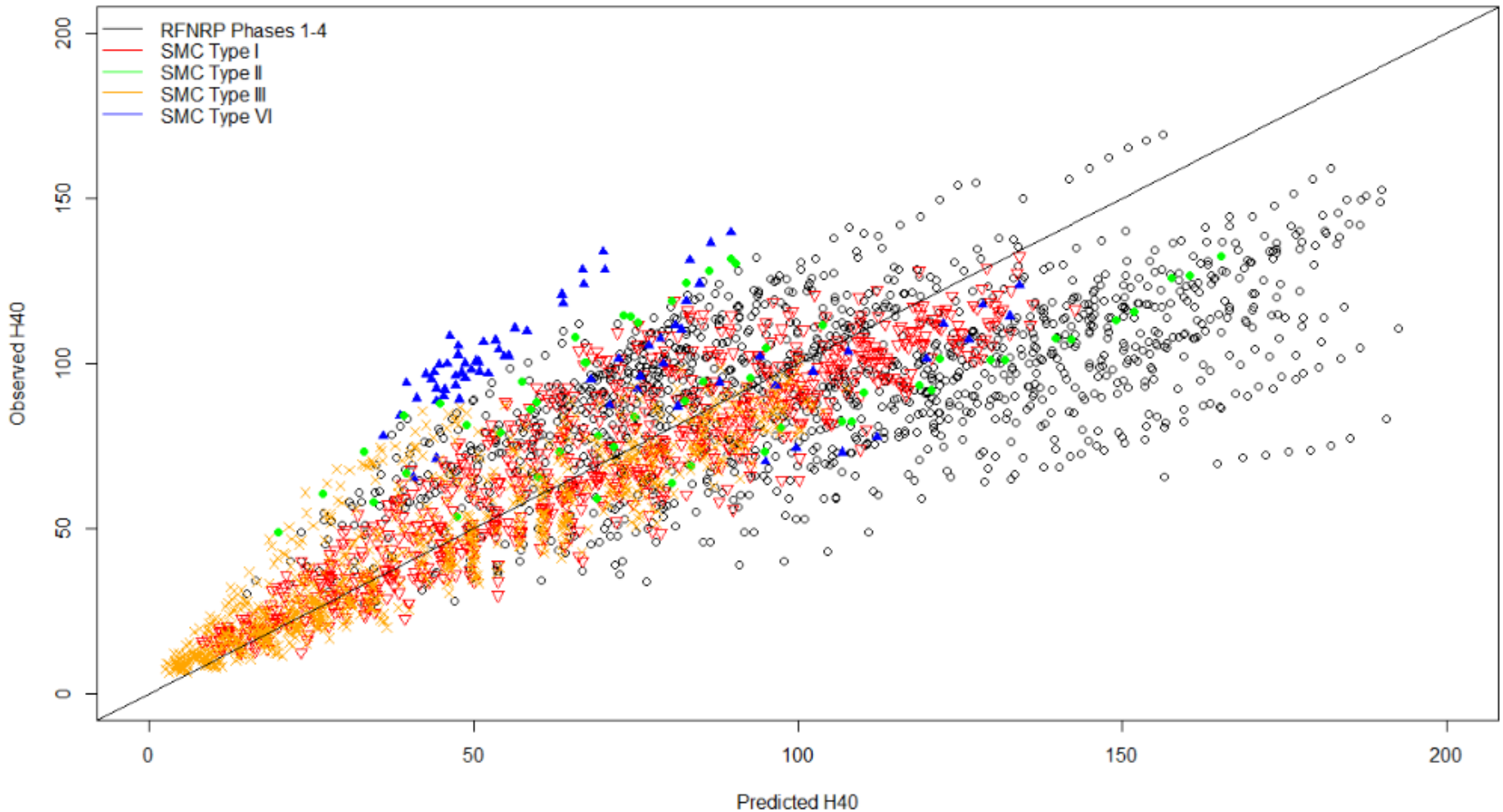
R-sq: 96%; RMSE: 0.21 ; MAE: 0.151 ; MAPE: 14%



Current Progress

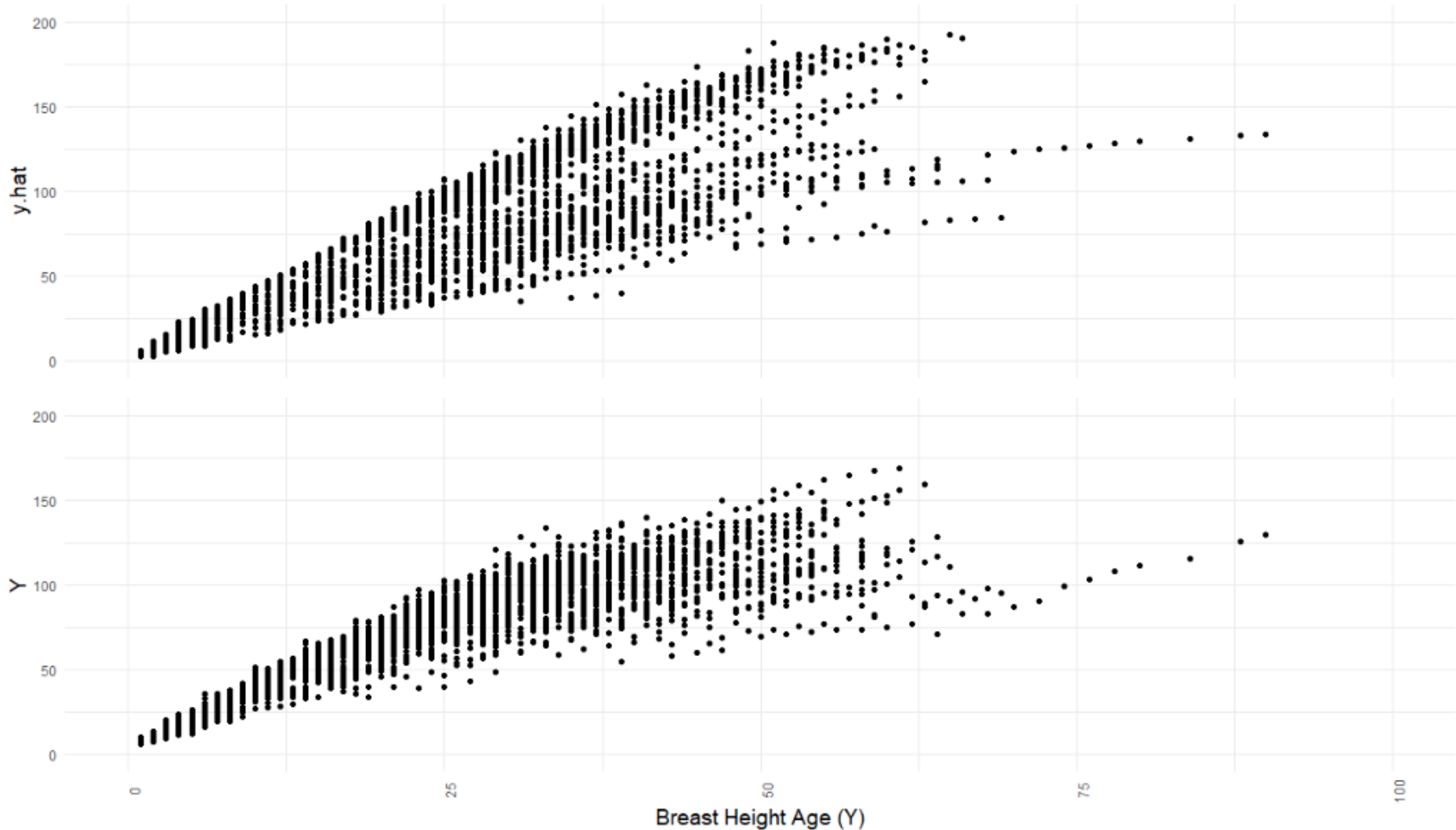
Observed and Predicted heights by Data Source

R-sq: 70%; RMSE: 27 ft, MAE: 21 ft, MAPE: 53%



Current Progress

Predicted (top) and Observed (bottom) Heights by Breast-Height Age



Future Plans

1. Observed relationship between *rate* and *shape* parameters indicate a uniqueness and independence to *shape*. Relationship is robust across age, location, spacing, and natural vs. planted. The largest shape values are fitted on the older, dense stands.
2. Include soil data attributes in RHS predictor set for both rate and shape. Shape in particular is a number that exists “in the wild” and is likely a complex function of many variables and their interactions.
3. Exploration of machine-learning techniques to relate (*rate*, *shape*) to various static, periodic, and dynamic predictors.
4. Online tool for mapping of base layers (predictors) and facilitating site index predictions in development through partnership with Precision Forestry Cooperative at University of Washington.

