

PIs and Affiliations:

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Project Title:

Robust Small-Area Estimation Strategies for Developing Accurate Stand-Level Diameter Distributions

Period for Report:

July 1, 2024, to Dec. 31, 2024

Progress:

Comprehensive Literature Review: Conducted an in-depth review of SAE methodologies, refining the project's approach and compiling relevant codes. Identified novel applications of small-area estimation in forestry, incorporating recent advancements in machine learning-based SAE frameworks.

Forest Inventory Data Collection: Engaged with PotlatchDeltic, Green Diamond, and Manulife to refine data requirements and acquire relevant datasets. Expanded discussions with the National Forest System (NFS) and initiated meetings with Karin Wolken and Luis Lopez to facilitate data acquisition. They are now in the process of gathering stand exam and LiDAR plot data for us.

Auxiliary Data Sourcing: Collaborated with Jacob Strunk (FIA representative) and Washington DNR to finalize the transfer of 3D NAIP products for Washington State. Successfully initiated the transfer process of free 3D NAIP data from the Oregon Department of Forestry through Sean McKenzie and his team. Progressed with the contractual acquisition of 3D NAIP products in collaboration with Hexagon, USFS, NRCS, PotlatchDeltic, and Green Diamond, aligning with the interests of the user group.

Next Period Plans:

Finalizing Data Preprocessing: Complete the integration and harmonization of 3D NAIP, Sentinel-2, and LiDAR datasets. Implement scalable data processing pipelines for deriving essential predictor variables.

SAE Methodology Implementation: Advance and implement robust small-area estimation (SAE) techniques, emphasizing the application of a multi-output predictive modeling framework through the extension of the random-weight neural network Fay-Herriot model.

Project Coordination & Deliverables: Maintain bi-weekly PI meetings and quarterly advisory board meetings. Publish initial findings in a technical report and prepare for potential conference presentations or journal submissions based on model outcomes.

Problems or Delays:

Delays in sourcing 3D NAIP products due to contractual processes.

Challenges in aligning auxiliary data timelines with stand inventory data.