Progress Report

NSF START: University of Maine and University of Maine Fort Kent

CAFS.21.92

Investigators

PI: Rubert-Nason, K. – University of Maine at Fort Kent
Weiskittel, A. – University of Maine at Orono
Thompson, N. – University of Maine at Fort Kent
Rogers, N. – University of Maine at Orono

Presenter: Kennedy “Ned” F. Rubert-Nason

Project Overview

Goal: Better-understand commercial tree responses to stress

1. Hyperspectral imaging to assess tree health (Rubert-Nason *et al.* UMFK)
- Develop computational model for health assessment of *Populus* and *Picea* trees from hyperspectral images
- *Skills*: Tree measurement, specimen collection, phytochemical analysis

2. Effects of microclimate on forest regeneration (Rogers *et al.* UMaine)
- Identify climactic variables that influence tree regeneration
- *Skills*: Install climate monitoring equipment, conduct FIG surveys

3. Estimation of wood moisture content (Li *et al*. UMaine)
- Develop computational model for using NIR spectroscopy to rapidly estimate wood moisture content
- *Skills*: Operate portable NIR spectrometer, tree coring, gravimetric analysis

Transferrable skills: Develop communication, innovation, and leadership skills

Current Progress

1. Hyperspectral tree health assessment
- All field data collected for *Populus* & *Picea*
- Approx. 75% of *Populus* lab data complete
- Geospatial analysis underway

2. Microclimate and forest regeneration
- 2 of 3 climate monitoring stations installed
- FIG plots established and surveyed

3. Wood moisture content
- ~50 wood core samples collected, scanned and analyzed for moisture content

CAFS funded two student interns, indirectly supported 6+ undergraduates since 2021

Future Plans: Involve undergraduates in research

1. Hyperspectral tree health assessment

- Data curation (ongoing)
- Phytochemical analysis (AY2022-23)
- Peer-reviewed publication (AY2023-24)
- Share computer code for predicting tree health from hyperspectral images

2. Microclimate and forest regeneration

- Install more climate monitoring stations
- Collect/curate climate and FIG data

3. Wood moisture content

- Analyze more cores for moisture
- Build calibration model

4. Proposed initiatives (in prep./review)

- Blueberries
- Undergraduate learning network