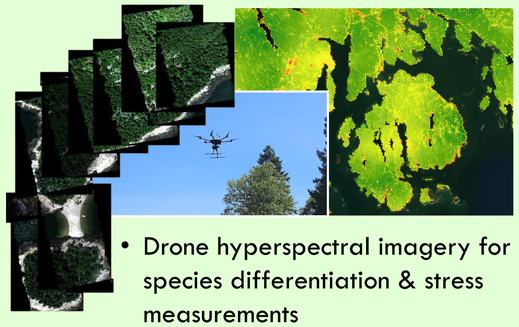
Management and Conservation of Maine's Coastal Spruce Forests for Resilience to Rapid Warming

Colby Bosley-Smith[1], Rose Gellman[1], Megan Grega[1], Emily MacDonald[1], Gregory McHale[1], Camilla Seirup[2], Jay Wason[1], Shawn Fraver[1], Daniel Hayes[1], Nicole Rogers[3], Peter Nelson[4]

1. University of Maine School of Forest Resources, 2. Northeast Temperate Network, 3. Maine Forest Service, 4. Laboratory of Ecological Spectroscopy

Where are coastal spruce forests and how 'stressed' are they?

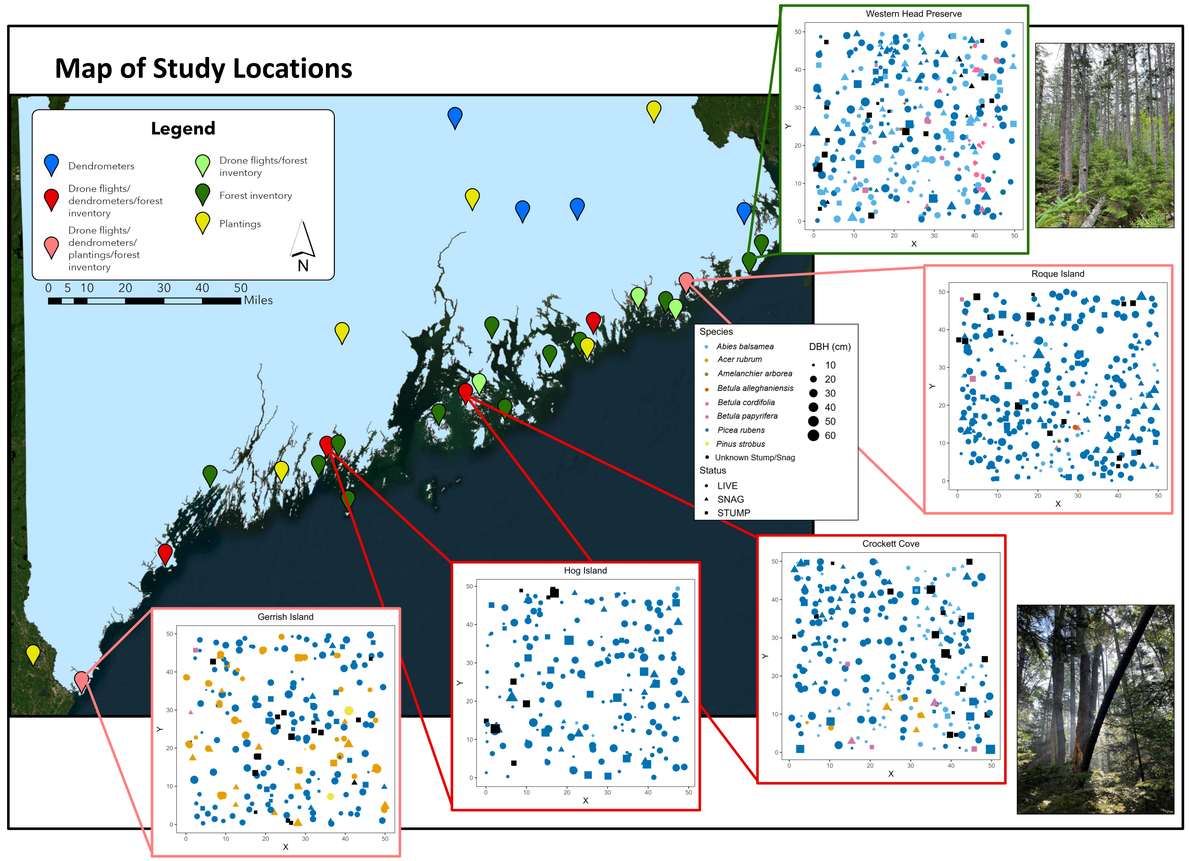


- Drone hyperspectral imagery for species differentiation & stress measurements
- Spaceborne ECOSTRESS sensor for quantifying climate-induced stress

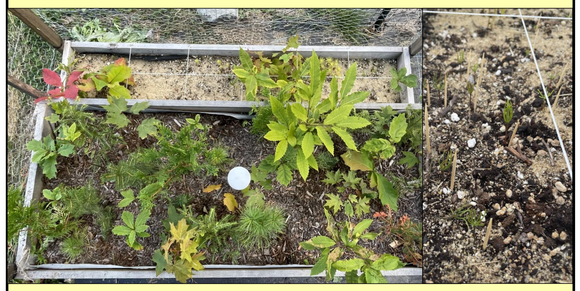
Introduction

The coast of Maine has historically served as a climate refugia for red spruce forests. We hypothesize that rapid warming along the coast make these forests extremely vulnerable to climate change due to low species diversity, limited active management, the species' requirement for cool moist conditions.

Map of Study Locations



How will climate change influence tree regeneration?



- Emergence, growth and survival of 10 species along coastal and inland climate gradients

Can we predict threats to coastal spruce forests?

- Tree-rings to measure annual growth and disturbance history
- 100 automated point dendrometers to measure daily growth and water use
- Microclimate sensors, hemispherical photos, soil nutrient analysis

What management options exist?

Acknowledge Dynamic Equilibrium

- Coastal spruce forests' primary natural disturbance agent remains windthrow
- Manage for age-class and structural diversity across the landscape

Assisted Migration

- If spruce regeneration fails, consider planting predicted "climate winners" to maintain canopy cover

Connect with us!

colby.bosleysmith@maine.edu stand dynamics & tree ring analysis
rose.gellman@maine.edu forest management
megan.grega@maine.edu dendrometer network
emily.macdonald@maine.edu seedling growth and physiology
gregory.mchale@maine.edu hyperspectral imagery

Next Steps

- Link ECOSTRESS to dendrometer-derived tree stress
- Evaluate climate-growth relationships
- Explore connections with other coastal forest ecosystems
- Develop management interventions with coastal land stewards

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