Progress Report

Site-stand dynamics and pine beetle mortality in pine ecosystems

(Companion Study to CAFS 19.75)

UofI: Haley Anderson, Mark Kimsey, Steve Cook
Potential Collaborators: John Couture, Purdue; Aditya Singh, Florida; David Coyle, Clemson; Recruiting interested parties

Presenter: Haley Anderson

Project Overview

Western Pine Beetle

- Explore site/stand variables related to western pine beetle susceptibility to create a susceptibility model

- Incorporate climate and abiotic data into susceptibility models for both western and mountain pine beetles
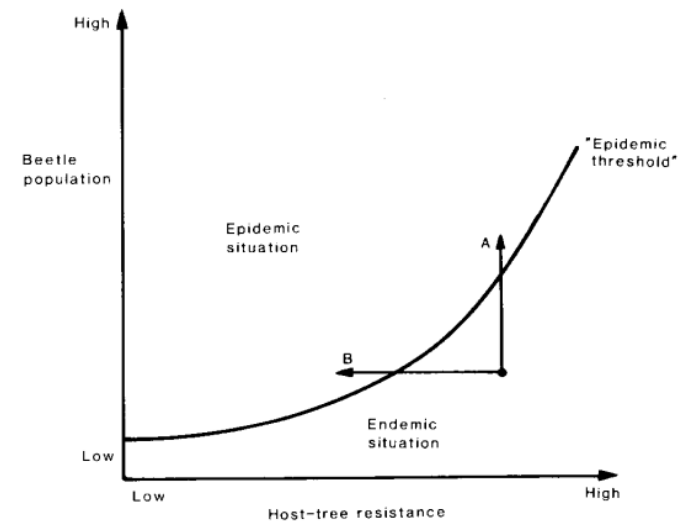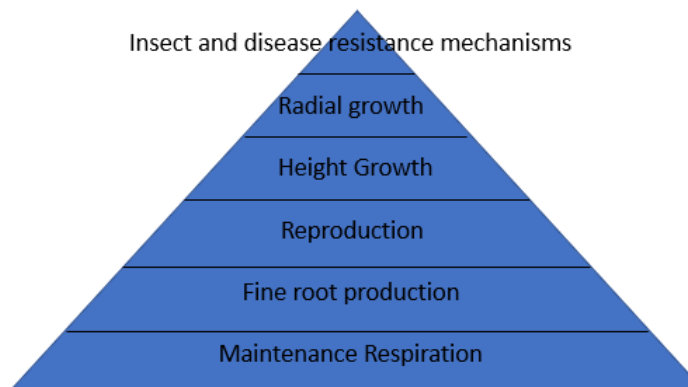
Southern Pine Beetle

- Utilize remotely sensed satellite imagery and site/stand data to create a southern pine beetle predictive model sensitive to climate

Dave Powell, USDA Forest Service (retired), Bugwood.org

Insect and disease resistance mechanisms
- Radial growth
- Height Growth
- Reproduction
- Fine root production
- Maintenance Respiration

Data acquisition for western pine beetle model:

Dataset	Relevant Information
USFS Insect and Disease Detection Surveys	Outbreak year, spatial footprint, outbreak size, presence of other insect/disease agents within outbreak footprint
GSSURGO	Available Water, Soil Organic Carbon, Lithology, Depth to Restrictive Layer
ClimateNA	Mean annuals (Temperature, Precipitation), 30-year normals (Temperature, Precipitation)
Various sources	Elevation, slope, aspect, latitude, Topographic Wetness Index, Heat load
USFS Lidar Products	SDI, Basal Area
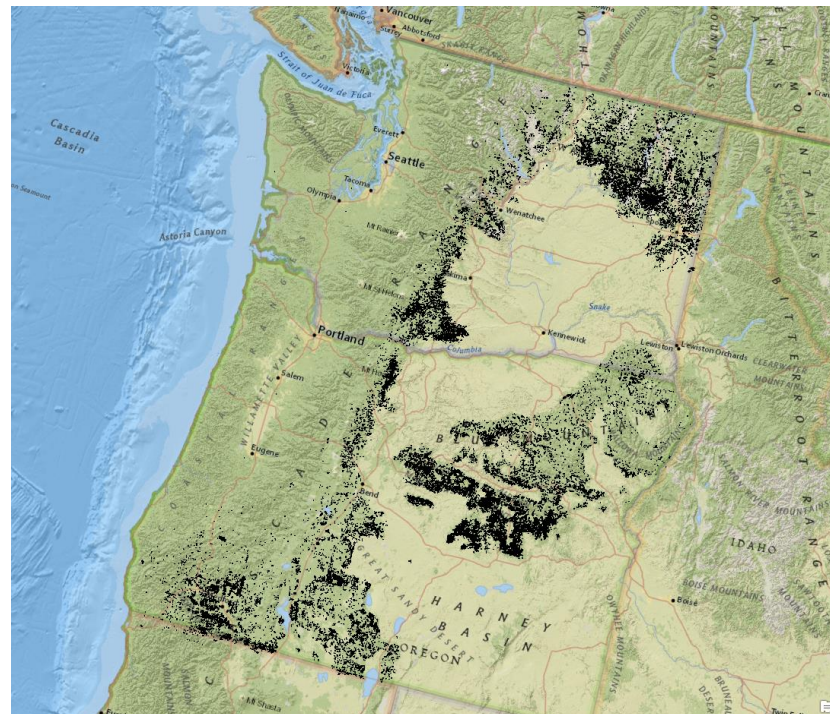
Western Pine Beetle:

- Identification of size/density thresholds for mountain/western pine beetle

- Determination if and at what point in stand development climatic conditions induce pine beetle outbreaks

- Determination if climate change indicates shifts in pine carrying capacity as a function of site type and species composition

- A western/mountain pine beetle management guide for ponderosa pine stands flexible to climate, species composition, site type, and method of measurement
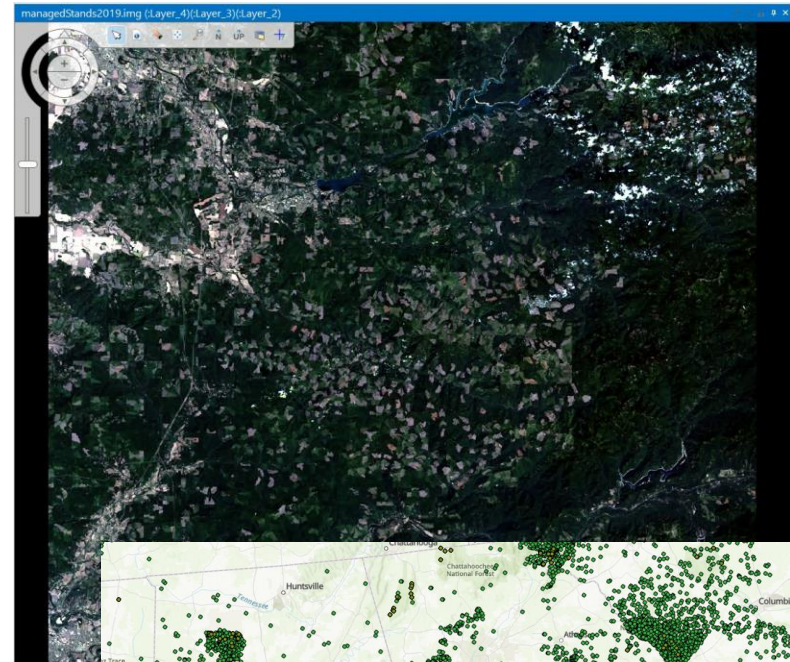
Southern Pine Beetle:

- Collect available pine beetle outbreak data

- Utilize available remotely sensed imagery (GEE) to correlate site/stand factors at 30-meter pixel scale (temperature, precipitation, NDVI

- Utilize *in situ* plot data to correlate to site/stand factors at stand scale (density, species composition)