Scope of Laurel Wilt Mortality to Redbay Forests

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Research Topics

- Large-scale population impacts
- Redbay (*Persea borbonia*) and swampbay (*P. palustris*) communities
- Aftermath of Laurel Wilt
- Seedling survival
Large-Scale Population Impacts

- Forest Inventory and Analysis (FIA) Database
  - National inventory
  - Two phases: remote sensing and ground survey
  - Population estimates calculated from moving mean

- Four Scales
  - Range-wide population
  - State-wide populations
  - County level density
  - Individual mortality predictions

O’Connell et al. 2015
Range-Wide Population

Modified from Shearman et al. 2015
State-Wide Population

Modified from Shearman et al. 2015
County-Level Density

• First Survey
  • No LWD in county for all plots
• Second Survey
  • No Wilt, n = 382
  • Wilt, n = 229

Shearman et al. 2015
Individual Mortality Predictions

- Logistic Regression
  - Diameter
  - Years of Infection
- Two data sets:
  - Model data, $n = 828$
  - Validation data, $n = 883$
- Overall Accuracy = 94%
  - 97% Live
  - 74% Dead

Shearman et al. 2015
Redbay and Swampbay Communities

• Are there differences in redbay and swampbay communities?
• Do these vegetation groups differ in terms of bay importance?
• Which communities are more at risk?
Redbay and Swampbay Communities

• Carolina Vegetation Survey (CVS)
  • Designed to document natural vegetation of the Carolinas
  • [www.cvs.bio.unc.edu](http://www.cvs.bio.unc.edu)
  • 452 plots surveyed from 1988 – 2012
    • NC, SC, and GA
    • Only sites with redbay and swampbay
• Ordination, cluster analysis, indicator species analysis
NMS Ordination

Red pyramids = Redbay plots
Green pyramids = Swampbay plots
Teal pyramids = Both species
NMS Ordination + Cluster Analysis

Seven unique groups:
- Maritime Forest
- Deciduous Hardwood
- Baldcypress/Water Tupelo Swamp
- Mixed Hardwood Swamp
- Longleaf Pine Woodland
- Sweetbay/Loblolly bay forest
- Pond Cypress/Holly Depression
Bay Importance

![Graph showing log importance values for different vegetation groups including Mixed HW Swamp, Maritime Forest, Pond Cypress/Holly Depression, Baldcypress Swamp, Deciduous HW Forest, Sweetbay/Loblolly bay Forest, and Longleaf Pine Woodland. The bars represent the mean importance values with error bars indicating variability.]
Bay Basal Area

Vegetation Groups

Mixed HW Swamp  Maritime Forest  Baldcypress Swamp  Pond Cypress/Holly Depression  Sweetbay/Loblolly bay Forest  Deciduous HW Forest  Longleaf Pine Woodland

Note: There are additional outliers > 5 m²/ha
After Laurel Wilt

• What is the community response after LWD?
• Is there regeneration of *Persea* spp.?
• Does the increase of woody debris have implications on fire behavior?
• Is the response different between redbay and swampbay communities?
Project Overview

- Survey communities impacted by LWD
  - Different years of recovery
  - CVS Protocol
  - Measure down woody debris
Site Locations

Legend
- LW Plots
- LW Year
  - 2004
  - 2005
  - 2006
  - 2007
  - 2008
  - 2009
  - 2010
  - 2011
  - 2012
  - 2013
Live Redbay Stems

![Graph showing mean density (m²/ha) vs. diameter class (cm) for different years since LWD.](graph.png)
Wilted Redbay Stems

![Graph showing mean density (m²/ha) by diameter class (cm) and years since LWD (1-2, 4-8, 9-10).]
Seedling Survival
Sources of Recruitment?
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Questions?