

POST-INVASION FORESTS: COMPOSITION AND STRUCTURE FOLLOWING INVASIVE SPECIES ESTABLISHMENT – YEAR 1 PROGRESS REPORT

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Introduction

In the southern Appalachians and elsewhere, numerous exotic pest complexes threaten forest health and sustainability. Emerald ash borer (EAB), thousand cankers disease (TCD), and laurel wilt disease (LWD) are current and emerging exotic pests threatening forests in Kentucky and throughout the southeast. Given the prevalence of susceptible host material in the region, post-invasion forests will undoubtedly differ in composition and structure from their pre-invasion counterparts. We are evaluating the nature and extent of these differences, and addressing data gaps associated with insect and disease risk models. Our goal is to document changes in the composition and structure of deciduous forests following establishment of selected exotic invasives in the southern Appalachian region, focusing on EAB, TCD, and LWD.

Methods

We are censusing forest vegetation to assess current conditions in relevant forest types, and using these vegetation assessments to predict the outcome of invasion, establishment, ensuing interactions, and future forests following invasion by these selected exotics. In summer 2010, we used FIA data (C. Oswalt, USFS FIA, Knoxville, TN) to locate suitable resources. We census the woody plant community using USFS protocols (NRIS, FS Veg, CSE) in 0.04 ha (1/10 ac) fixed radius plots (n=3 plots/stand). Woody plant identification, average age, height, diameter, basal area, spacing and radial growth are measured. Canopy structure, ground surface cover, slope, slope position, elevation, and aspect are assessed. Woody plant abundance, diversity, and richness are computed for each plot. Using FVS, we plan to model species-specific and age-specific mortality/removal to simulate the effects of EAB, TCD, and LWD. The potential to overlay a silvicultural management tactic such as prescribed fire will be explored, and incorporated if possible.

Progress – 2010

Forty forest stands were censused in 14 counties statewide in 2010 (Fig. 1). There were 9 plots censused in each county, with the exception of Kenton, where only 6 plots were censused. Canopy composition was averaged across plots within each county to determine its applicability for modeling the invasives of interest (ash for EAB, walnut or butternut for TCD, and sassafras for LWD) (Table 1). Our future censusing efforts will focus on gaining suitable baseline data to model all three species of interest.

Emerald Ash Borer

North American ash are especially susceptible to EAB, and attack is usually fatal (Fig. 2). Immediately after its 2009 arrival in Kentucky, a 20 county area was quarantined. EAB has been reported in 9 of these counties, and our censusing efforts focused in this area (Fig. 1). All counties censused in 2010 had an overstory ash component (>5" dbh) of 13-77% (Table 1), making them suitable for FVS modeling to simulate EAB-induced ash mortality and to predict subsequent changes in forest composition and structure (Fig. 3). No additional data is needed.



Fig. 2. EAB and damage to ash

Fig. 1. Forest stands censused in KY in 2010

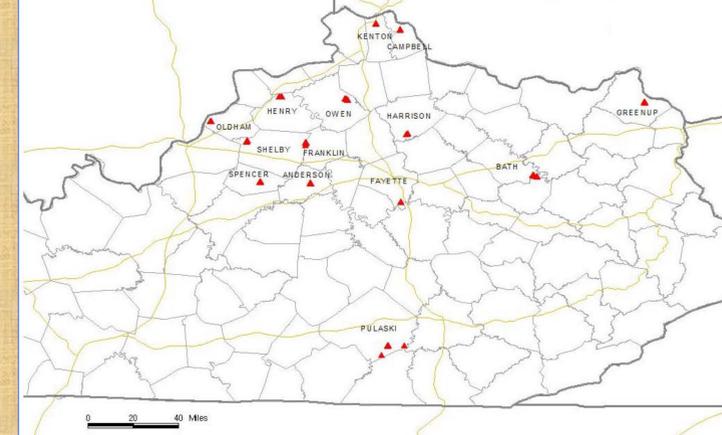


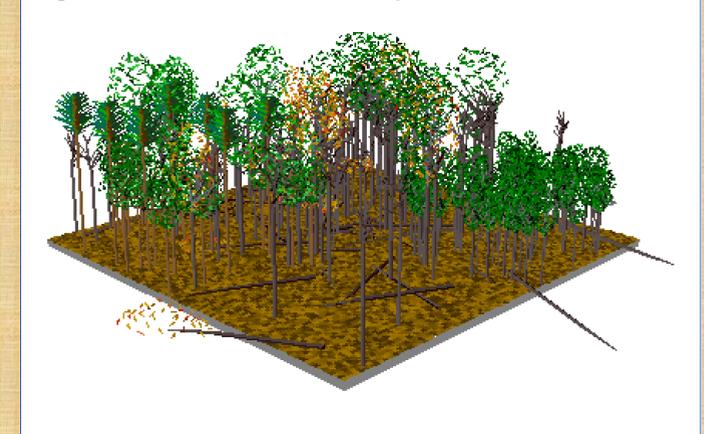
Table 1. Results from vegetation censusing in 14 counties in KY

County	EAB presence/absence	Canopy Species Composition (% of stems)		
		Ash	Walnut	Sassafras
Anderson	-	17.8%	1.6%	0%
Bath	-	24.4%	0%	4.1%
Campbell	+	32.5%	0%	0%
Fayette	+	19.2%	5.1%	0%
Franklin	+	20.9%	0%	9.3%
Greenup	+	20.1%	0%	4.2%
Harrison	-	23.0%	0%	0%
Henry	+	13.7%	3.8%	0.3%
Kenton	+	24.3%	2.7%	0%
Oldham	+	77.0%	3.2%	0%
Owen	+	20.5%	1.2%	1.2%
Pulaski	-	18.6%	1.4%	0.7%
Shelby	+	32.4%	4.6%	1.3%
Spencer	-	18.9%	5.7%	0%

Thousand cankers disease

TCD is an insect-associated pathogen complex of walnut in the western USA. It's not found in Kentucky, but was discovered in Knoxville, TN in August 2010. Six counties censused in 2010 have an overstory walnut component (>5" dbh) >2% (Table 1), making them suitable for FVS modeling to simulate TCD-induced walnut mortality and to predict subsequent changes in forest composition and structure (Fig. 3). Censusing efforts in 2011 will focus on obtaining additional data for TCD simulations.

Fig. 3. FVS-forecasted forest composition and structure



Laurel wilt disease

The pathogen complex responsible for LWD is not found in Kentucky, but it poses a threat to the alternate hosts, sassafras and spicebush, in the southern Appalachians. Only three of the counties censused in 2010 had a sassafras component adequate (>2%) to include in our simulations (Table 1). Future efforts will focus on obtaining additional data for LWD simulations.