



Regeneration Dynamics of an Old Growth Urban Forest: A 30-year Comparison in Memphis, TN

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Introduction

Overton Park in Memphis, TN

- Old Forest State Natural Area - 126 acres
- Within 20 minutes of 1,000,000 people

Challenges:

- Heavy use/ trail maintenance
- Invasive species
- Dysfunction of regeneration dynamics (Guldin 1987)
- Public perception of forest health



Objectives

- How has the species composition changed over time?
- Are the regeneration dynamics different from 1987?
- What does this suggest for forest management?

Methods

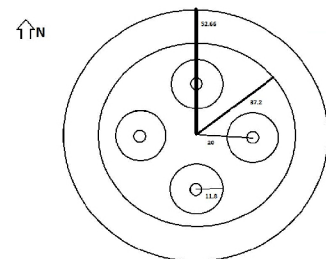
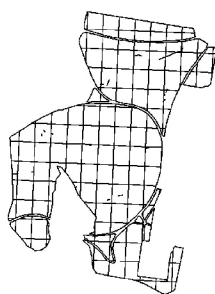
Data collection

- Replication of Guldin, 1987
- Nested plots
- Systematic grid
- 1 plot per 1.8 acres

Plot No		
Center x,y coordinates		
Date		
Subplot	Radius	Measurements
4	3.7'	0.5" < DBH < 2"
3	11.5'	2" < but < 4.6"
2	37.2'	4.6" < DBH < 9.6"
1	52.66'	9.6" < DBH
Invasive spp	Present	

Data analysis

- Species composition
- Trees per acre
- Basal area per acre
- Importance values



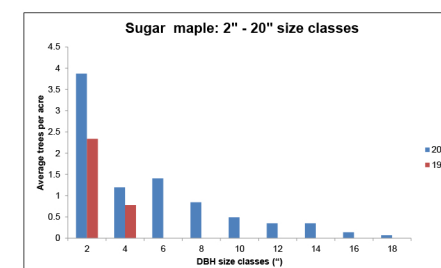
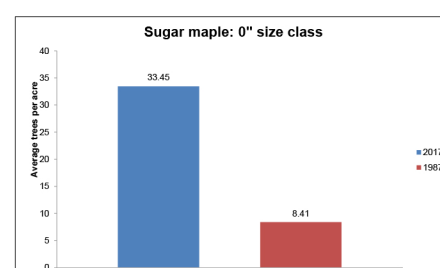
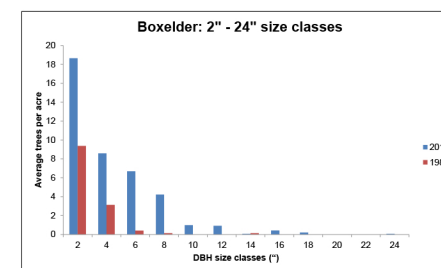
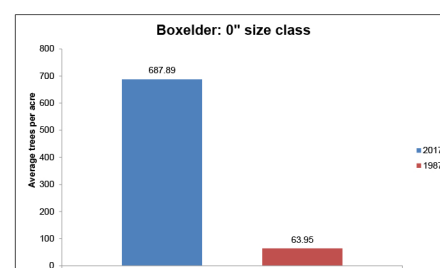
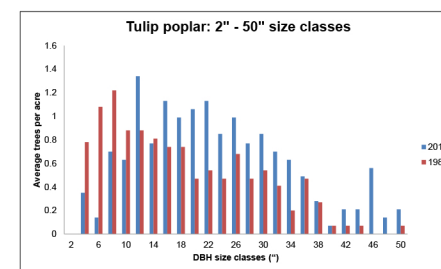
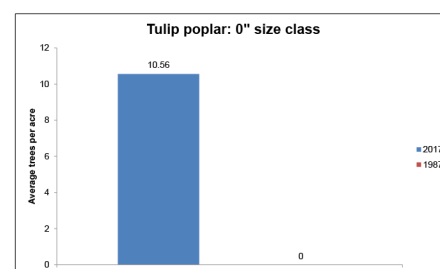
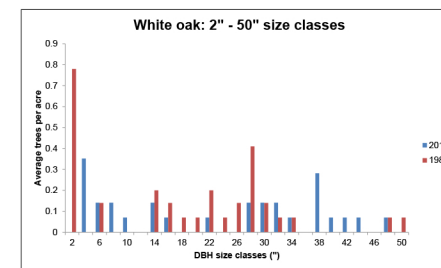
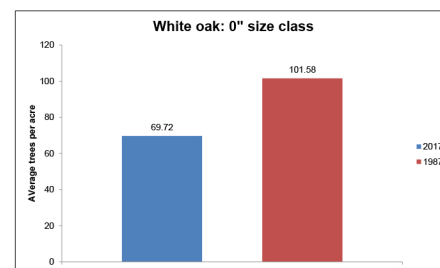
Results

Species	Present in 1987	Present in 2017	Native
<i>Ailanthus altissima</i> (tree-of-heaven)	NO	YES	NO
<i>Albizia julibrissin</i> (mimosa)	NO	YES	NO
<i>Broussonetia papyrifera</i> (paper mulberry)	NO	YES	NO
<i>Crataegus</i> spp. (hawthorn)	YES	NO	YES
<i>Maclura pomifera</i> (osage-orange)	YES	NO	YES
<i>Morus alba</i> (white mulberry)	NO	YES	NO
<i>Paulownia tomentosa</i> (princess tree)	NO	YES	NO
<i>Prunus caroliniana</i> (cherry laurel)	NO	YES	NO*
<i>Quercus michauxii</i> (swamp chestnut oak)	NO	YES	YES
<i>Rhus</i> spp. (sumac)	NO	YES	YES

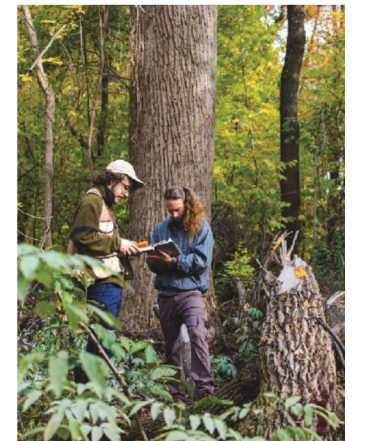
Species composition changes from 1987 to 2017

* Native to southeastern U.S. but not indigenous to Tennessee

Trees per Acre 2017 and 1987 Compared



Discussion



- Species richness is higher today than in 1987. However, the majority of new species are non-native. This is likely due to the high use and urban setting of the forest.
- White oak is less represented in the seedling stage (0") now than in 1987. This may be due to competition from non-native species or to the lack of seed banking.
- Tulip poplar has greater representation in the seedling stage now than in 1987. However, it has a high mortality rate from 0" to 2" size class perhaps due to competition..
- Boxelder is more abundant in all size classes today than in 1987. These appear to be concentrated in areas of historic kudzu infestations. Further analysis is warranted.
- Sugar maple is more abundant in all size classes today than in 1987. This could suggest a transition to later seral stages. Understanding the spatial distribution of the species would be helpful.

Conclusions

- Richness of native species has declined since 1987.
- Lack of white oak and high mortality of tulip poplar seedlings is a concern.
- Abundance and longevity of boxelder and sugar maple compared to 1987 should be further studied, especially spatially.
- Management strategies may need to include competition control especially from invasives and/or enrichment plantings.