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A Decade Comparison of Forest Dynamics at the Gordon Natural Area, A Chester County Preserve

Kelly Ryan
West Chester University

Gregory D. Turner
West Chester University, gturner@wcupa.edu

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A Decade Comparison of Forest Dynamics at the Gordon Natural Area, A Chester County Preserve



Kelly Ryan & Gregory D. Turner

Department of Biology, West Chester University of Pennsylvania, West Chester, PA



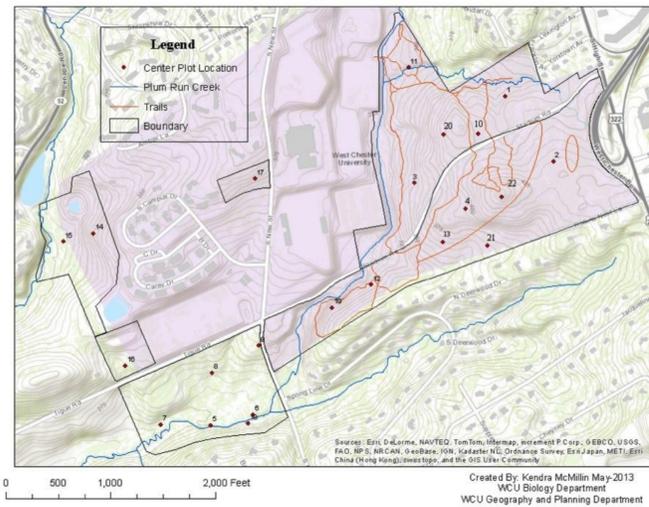
Introduction

Many Delaware Valley forests are declining in diversity and health due to anthropogenic impacts that affect tree health and recruitment in urbanizing areas such as fragmented forests and those affected by intense deer browse, exotic invasive organisms, and an increasing number of pathogens and pests. To better understand how one such forest in the region is faring over time, we conducted a comparative study of key tree health and demographic variables in 18 USDA forest health management plots established in 2002, and four new plots added in 2013, at WCU's Gordon Natural Area.

Study Site & Methods

- The 63 ha Gordon Natural Area preserve located in eastern Chester County, PA
- Four habitats including forest and wetlands communities of variable land use history
- 22, 672 m², randomly placed circular plots (18 surveyed in 2003-08, four new added in 2013)
- Tree abundance and densities, growth rates (via DBH measures), survivorship, and damage types were assessed per plot
- Shannon diversity and evenness assessed per habitat using Kruskal-Wallis NPT

Forest Health Monitoring in the Gordon Natural Area

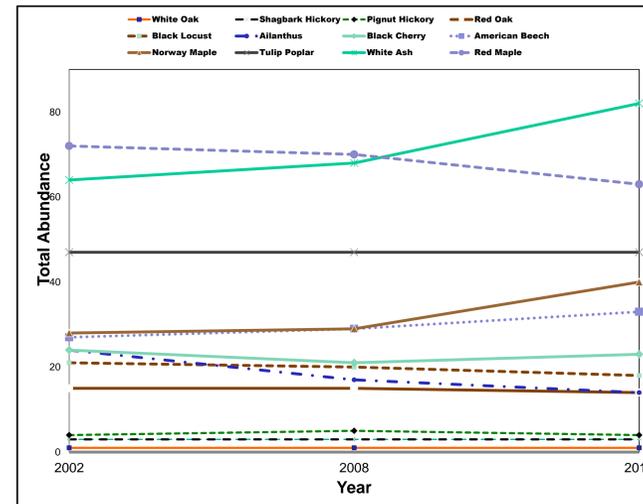


Forest health management plot locations (red diamonds)

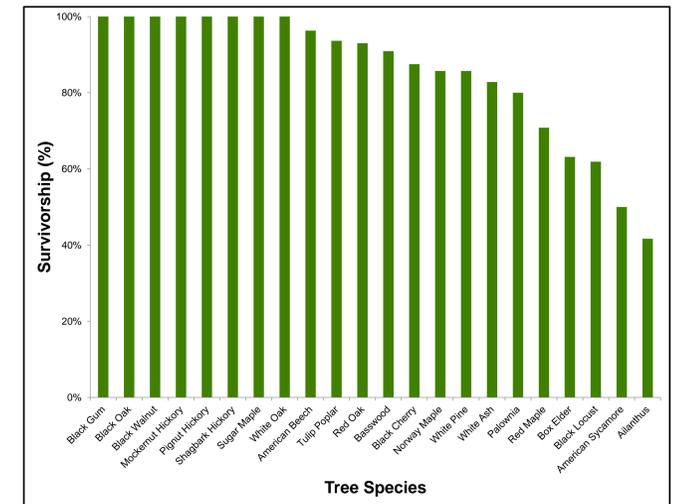


Assessing tree damage in an older forest habitat.

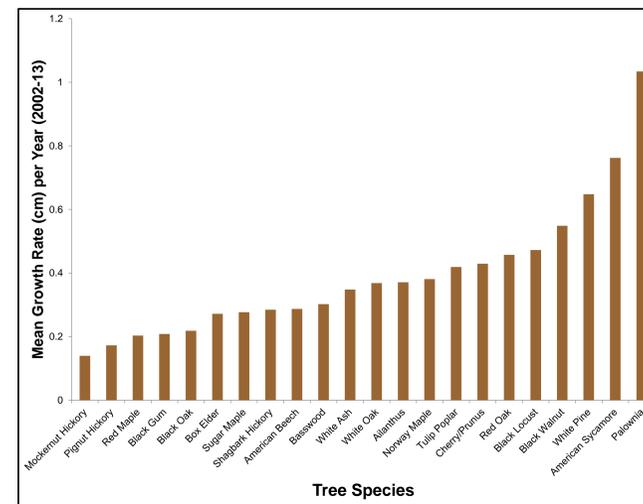
Results



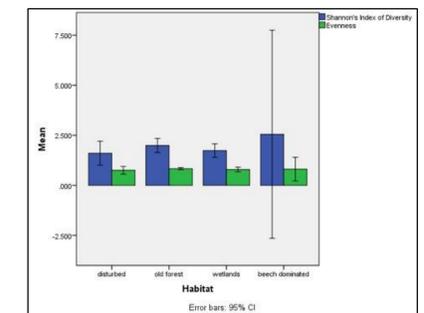
Total abundance per species (plots 1-18, 2002-13)



Percent survivorship per species (2002-2013)



Mean DBH growth rate (cm) per year



Comparisons of Shannon diversity and evenness between habitats

Discussion & Conclusions

- Total tree abundance was static or increased slightly from 2002-13 for most species, but declined for a few, reflecting successful survivorship and recruitment for some species.
- Some of the more abundant species had lower survivorship levels compared to other species from 2003-13, potentially due to competition.
- Abundance in 2013 was greater for early compared to late successional species, potentially reflecting land use history and disturbance factors that favor shade intolerant species.
- Most species with 100% survival were later successional species that are likely well established in favorable site conditions and usually have long life spans.
- Mean growth rates did not reflect successional status or exotic/native status, suggesting other unknown factors influence growth rates.
- Vine damage affected more trees than any other damage type, but primarily affected early successional species located in plots closer to forest edges or with gaps. Top breaks were also common, likely reflecting wind and storm effects, as were human disturbance (e.g. graffiti on American beech [*Fagus grandifolia*] trees).
- Red maple (*Acer rubrum*) and Red oak (*Quercus rubra*) were affected by more damage types than other species, likely reflecting high abundance of each species compared to others.
- Kruskal-Wallis test of variances yielded no significant differences in evenness or diversity between habitat types, likely due to variation between plots found within the same habitat.

Acknowledgements

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Contact Kelly Ryan at: kr734011@wcupa.edu for more information on this study.