Treefall Gap Dynamics in an Urban Old Growth Forest

URBAN FOREST REGENERATION – GAP DYNAMICS IN OVERTON PARK

Mac Wilson, Erin Deery, Griffin Williams, Colleen Hulsey, Luke Malanchuk, Tara Massad

Rhodes College —1848—

OVERTON PARK CONSERVANCY

INTRODUCTION

Overton Park contains a remnant of old growth forest dominated by oak (*Quercus spp.*), hickory (*Carya spp.*), sweetgum (*Liquidambar styraciflua*) and tulip poplar (*Liriodendron tulipifera*) that were once widespread. The forest contains a diverse community of native trees and herbs, but is heavily invaded by non-native herbaceous plants and trees (Heineke 2009). Additionally, it has long been observed that treefall gaps are not successfully regenerating (Guldin 1987), which raises concerns about the long-term health of the forest. This study was therefore conducted in order to understand whether gap and forest communities are diverging in seed arrival, germination, and seedling survivorship.

METHODS

Ten treefall gaps were identified in fall 2015 (**FIG. 1**). Two 1 m^2 seed traps were randomly placed in each gap, and two traps were placed in the forest surrounding each gap.

Figure 1

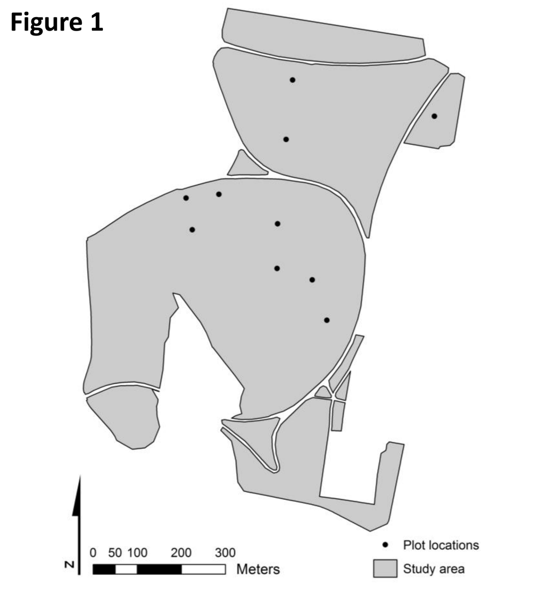
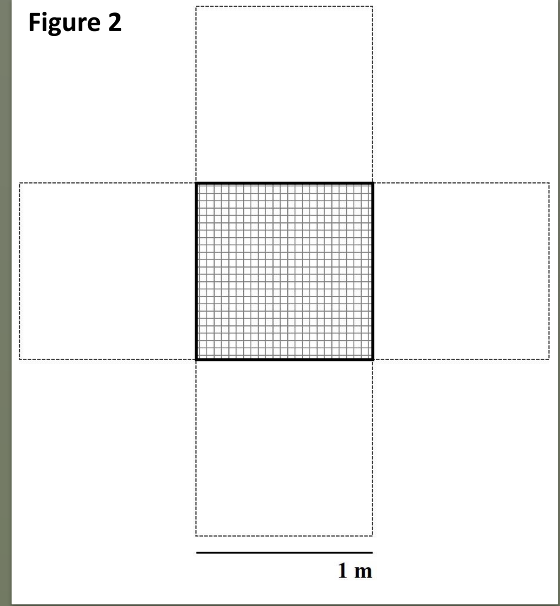


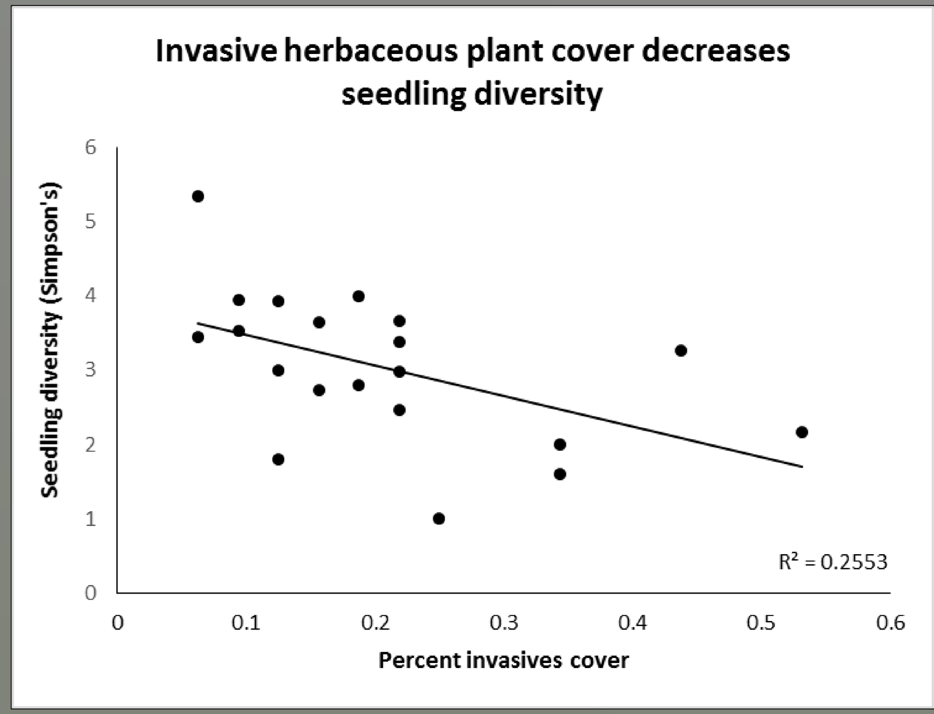
Figure 2

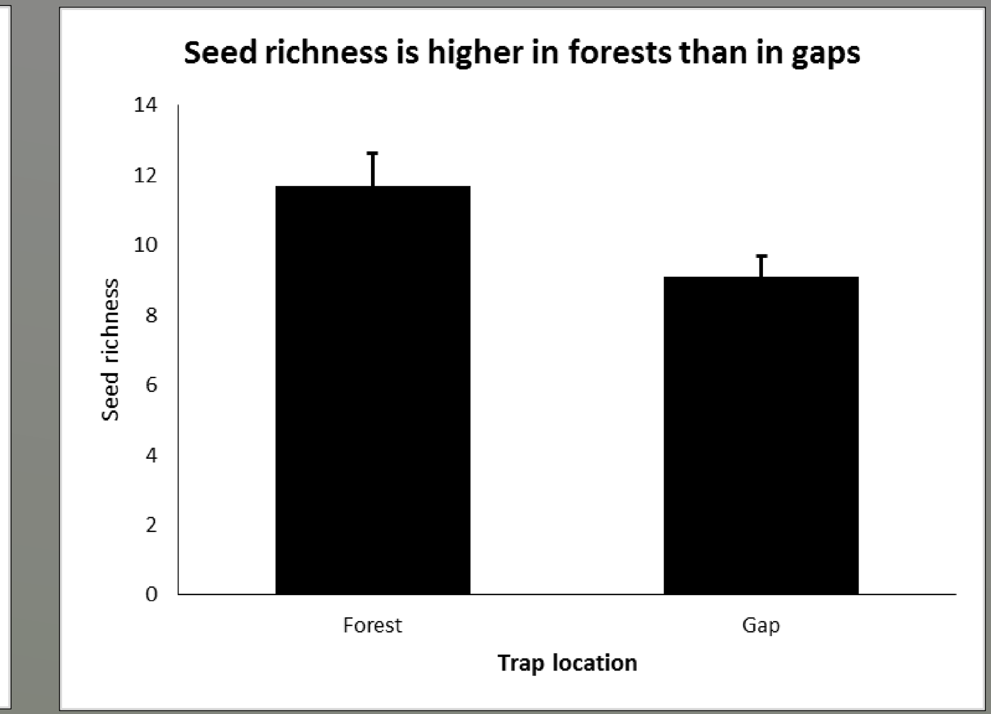


Each trap had a 1 m^2 plot on each edge (**FIG. 2, 3**) where seedlings were identified and measured and percent invasive cover was quantified in fall 2016. Seeds were regularly collected, counted, and identified over a growing season. Data were analyzed in R and with Spade (Chao et al. 2008).

Figure 3

RESULTS





	F	df	PE
Gap vs. forest	2.0	1,17	
Percent invasive species cover*	4.8	1,17	-3.7

* *p* > 0.05 PE = parameter estimate

	F	df	Direction
Overall MANOVA	3.0	1,18	
Seed response*	5.7	1,18	F > G
Seedling response	0.03	1,18	

* *p* > 0.05

	Forest seeds	Gap seeds	Forest seedlings	Gap seedlings	Adult
Forest seeds	1	0.869 | 19	**0.01 | 8**	0.503 | 13	**0.081 | 18**
Gap seeds		1	**0.002 | 5**	0.451 | 9	**0.056 | 14**
Forest seedlings			1	0.762 | 11	0.437 | 10
Gap seedlings				1	**0.146 | 15**
Adult					1

Grey boxes with bold text denote highly dissimilar communities

Similarity | Shared species richness

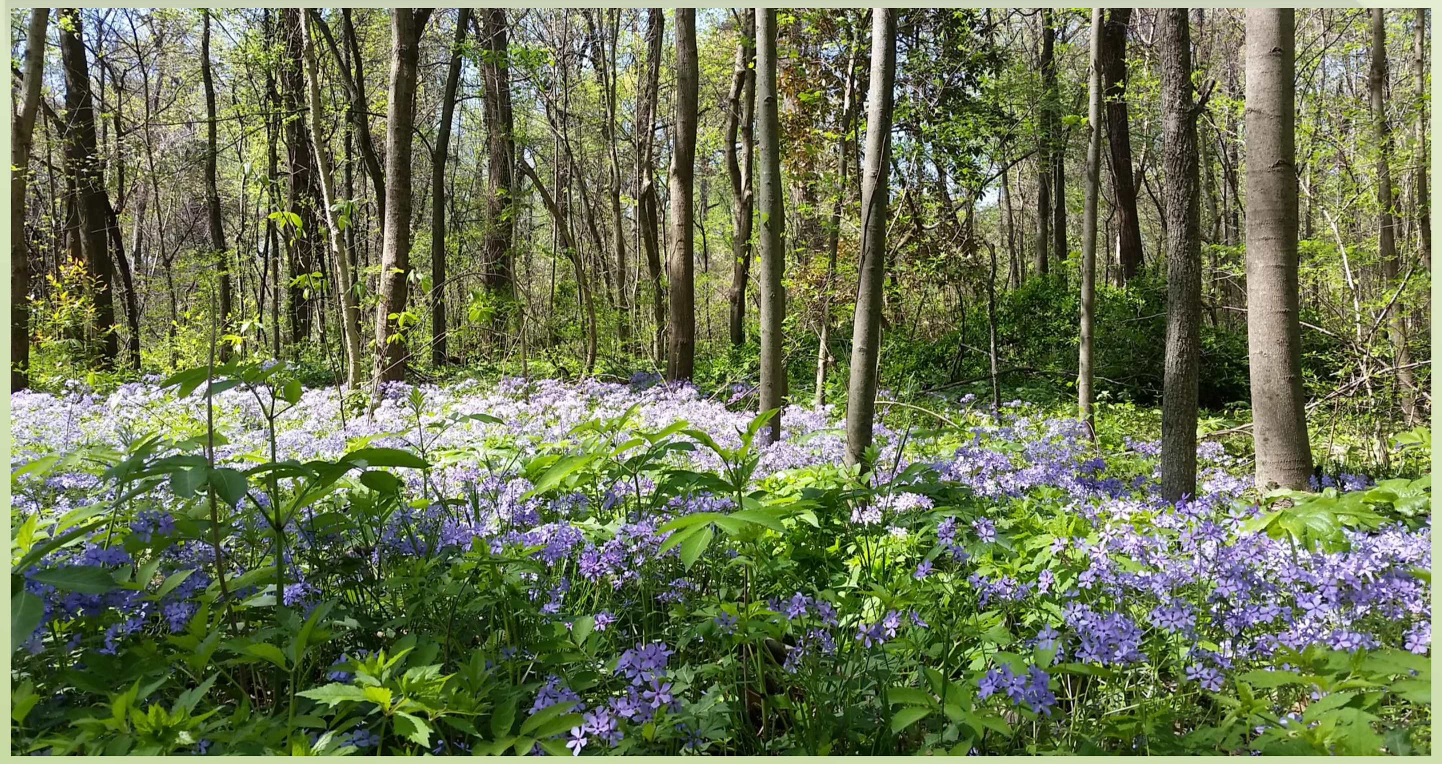
The overall Morisita similarity index for the five different communities is 0.333 (± 0.001 SE). Forest and gap seed communities are similar to one another, but differ considerably from seedling and adult communities. Additionally, forest and gap seedling communities are similar to one another. However, between the two seedling communities, forest communities are more similar to adults than the gap communities.

CONCLUSIONS

Our results indicate that tree communities at various life history stages differ considerably from one another. Seed communities were dominated by *L. tulipifera*, elms (*Ulmus spp.*), maples (*Acer spp.*), sycamore (*Platanus occidentalis*), and *L. styraciflua*. In traps, species may be biased toward wind-dispersed seeds. Invasive species such as Japanese honeysuckle (*Lonicera japonica*), wintercreeper (*Euonymus fortunei*), and English ivy (*Hedera helix*) negatively influence seedling diversity. The invasive shrub Chinese privet (*Ligustrum sinense*) was often found in gap seedling communities.

MANAGEMENT IMPLICATIONS

- Reducing cover of invasive species should be a priority for seedling recruitment
- Additional measures such as seed bank enrichment or planting of desired species may be necessary



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