

# Using deer enclosures to aid in forest understory restoration at Rider University

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## Introduction

• Since the 1800s when eastern wolves were eradicated in the eastern U.S., deer overpopulation has been negatively affecting the growth and biodiversity of understory vegetation in forests. White-tailed deer have been consuming understory vegetation at an unsustainable rate. Many native plants are favored by deer and do not have a chance to reach maturity. This will alter the composition of forests over time, reducing numbers of native plants while allowing non-native, invasive plant species to thrive.

• For this study, a one-acre plot of Rider University's forest was enclosed with a ten-foot-tall fence to prevent deer from entering. This land will be surveyed to understand which plant species the forest understory could be composed of if the deer population was under control.

• Hypothesis: In absence of deer, understory seedlings and herbaceous plants will be restored along with the forest floor. With this, native species will be able to thrive and reach maturity, rather than being consumed as juveniles. With an increase of native species, biodiversity will be increased and pollinators will return in higher population numbers.

## Methods

• Within the fencing, four transect lines are marked with flags, and plants are identified and counted in a 70cm space on either side of each transect. Along with this survey of native species, invasive species such as burning bush and oriental bittersweet are removed from the root of the plant to prevent regrowth. Transect lines will also be marked outside of the deer fence, to collect data on what growth is found in the presence of deer.

• Of the data collected, comparisons of the past two growing seasons recorded thus far will be recorded. The longer the fence has been up, the more time the understory is allowed to grow and produce young

## References

Binkley, D., Moore, M.M., Romme, W.H. *et al.* Was Aldo Leopold Right about the Kaibab Deer Herd?. *Ecosystems* 9, 227–241 (2006).

Thomas H. Pendergast IV, Shane M. Hanlon, Zachary M. Long, Alejandro A. Royo, and Walter P. Carson. 2015. The legacy of deer overabundance: long-term delays in herbaceous understory recovery. *Canadian Journal of Forest Research*. 46(3): 362-369.

## Results

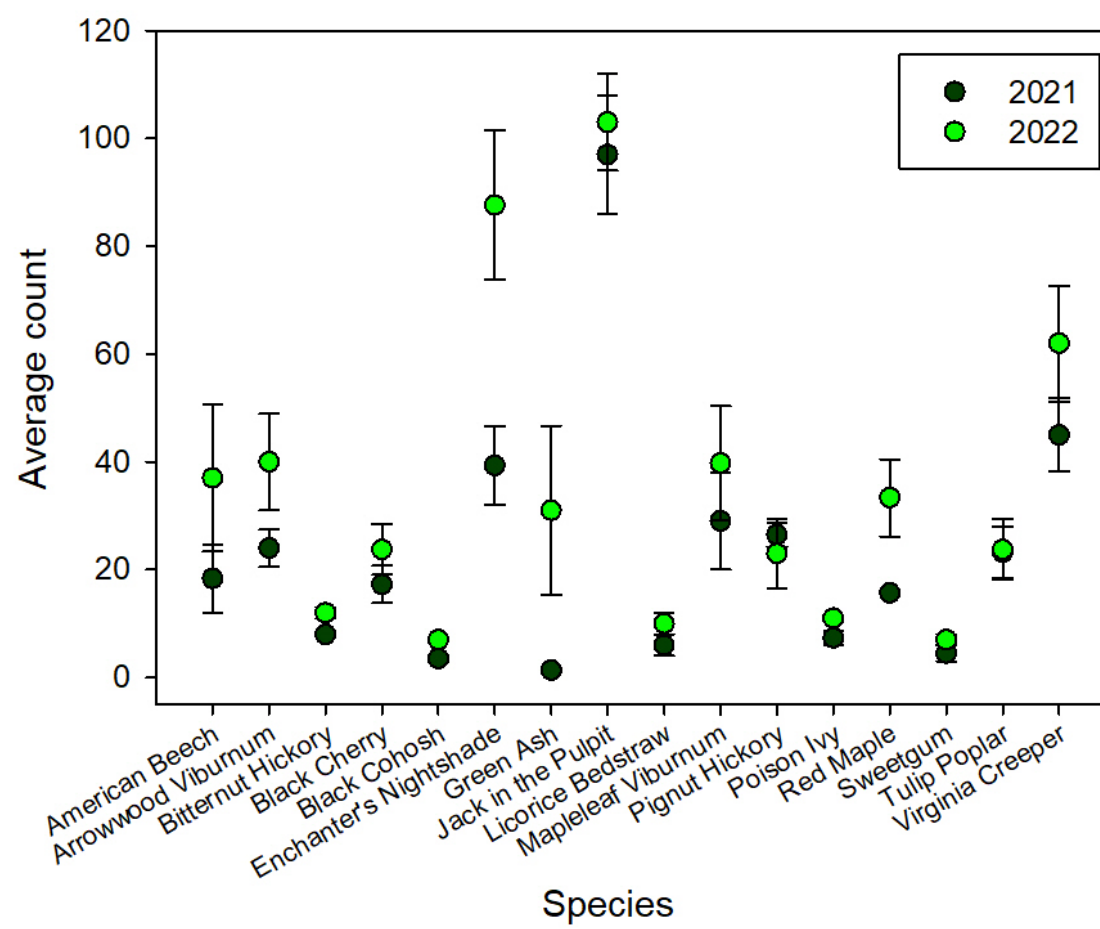


Figure 1. Average count of various native species found in transects 1, 2, 3 and 4 in 2021 and 2022.

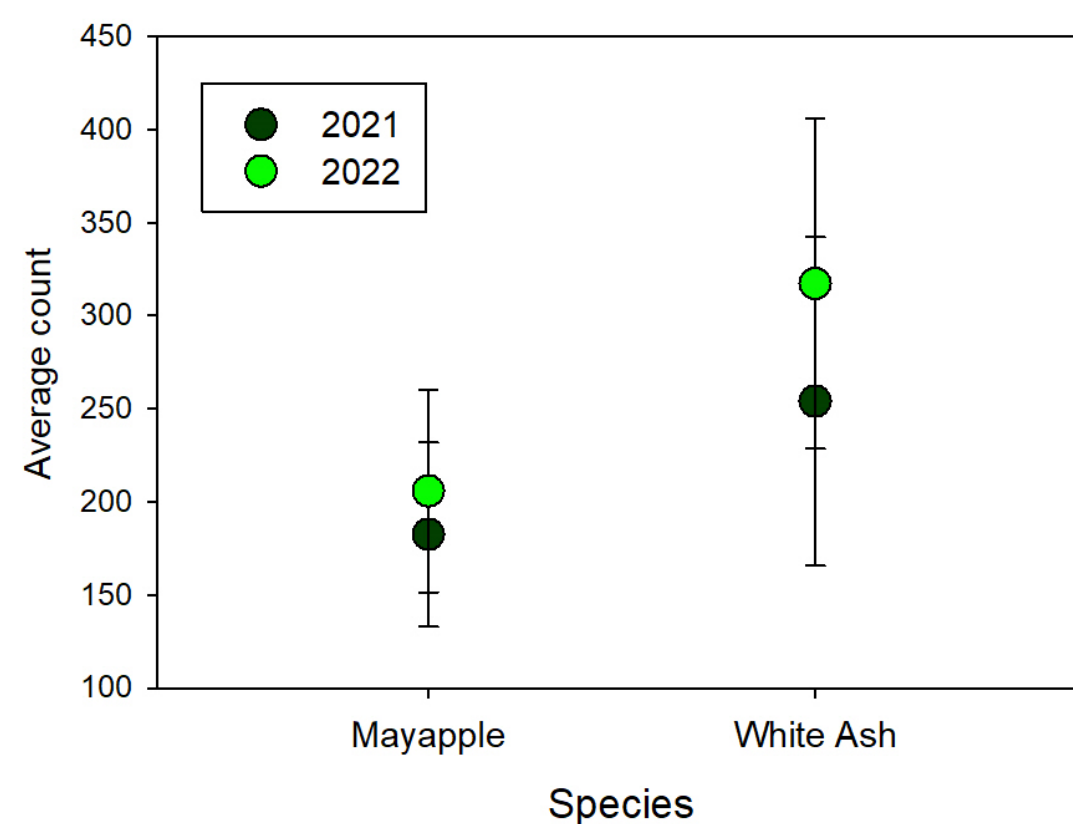


Figure 2. Average count of Mayapple and White Ash found in transects 1, 2, 3 and 4 in 2021 and 2022.



A few common native species found in the understory (From left to right) Pignut Hickory *Carya glabra*, Mayapple *Podophyllum*, White Ash *Fraxinus americana*

Table 1. There was a marginal increase of plants in the second year of measurements. Some species were more common than others as well.

Source	Degrees of freedom	F Ratio	P-value
Species	28	9.475	<0.001
Year	1	2.825	0.096



Invasive species that were removed (left) Oriental Bittersweet *Celastrus orbiculatus* (right) Burning Bush *Euonymus alatus*

Table 2. Number of invasive species removed in 2021 and 2022. After the first year of removal less Oriental Bittersweet and Burning bush grew back the following year.

Species	Year	Transect	Number Removed
Oriental Bittersweet	2021	1	64
		2	49
		3	43
		4	105
	2022	1	78
		2	40
		3	36
		4	41
Burning Bush	2021	1	133
		2	84
		3	281
	2022	1	35
		2	12
		3	26



## Conclusion

• The hypothesis was supported, in absence of deer, the understory within the fencing is able to restore itself and surpass its juvenile stage in growth.

• Since the understory within the fence will be in its third year of undisturbed growth, we expect the deer fence to have an even higher yield of native species this upcoming summer.

• Also, with less invasive species pulled in 2022, we expect there to be even fewer this summer. This means less competition for native species growing within the fence too.