

Summary of Previous Research on these Plots

Findings based on earlier studies of these plots have been published by Peebles-Spencer et al. (2017) and Haffey and Gorchov (2019). Forest floor plants were not significantly impacted by the treatments in 2011, 2012, or 2013, but by 2014 there was a positive effect of *L. maackii* removal on cover of tree seedlings, spring perennial forbs, vines, and graminoids, a positive effect of deer exclusion on cover of tree seedlings and shrubs, and a negative effect of deer exclusion on percent bare ground (Peebles-Spencer et al. 2017). In addition, there was synergistic interaction on bare ground between the deer and *L. maackii* treatment in spring 2013; bare ground was greatest where *L. maackii* was present and deer had access.

Forest floor vegetation was next surveyed in 2016, and by this time several variables showed significant interactions of deer and *L. maackii* treatments (Haffey and Gorchov 2019). Where *L. maackii* had been removed there was greater total cover and non-native species richness, and deer exclusion reduced bare ground and richness of native species and non-native species, and cover of annuals (Haffey and Gorchov 2019). In addition, synergistic interactions were evident for the cover of three different growth forms: tree seedlings, vines, and spring perennials. All three of these growth forms had greatest percent cover where deer were excluded and *L. maackii* was removed (Haffey and Gorchov 2019).

Haffey and Gorchov (2019) also measured, in 2015, every tree seedling and shrub between 0.3 m and 2 m tall, the typical deer browse height range (Frelich and Lorimer 1985). They found that deer exclusion increased native tree seedling density and richness, and shrub BA, results that were attributed to release of browse pressure, but there were no *L. maackii* or interaction effects on woody plant responses (Haffey and Gorchov 2019).

Table S1: Estimated white-tailed deer densities (deer km⁻²) at five sites within the Miami University Natural Areas for summer and winter 2014 (Barrett 2014) and spring and summer 2017 (Peterson 2018). Estimates were based on distance sampling of pellet-groups following methods of Urbanek et al. (2012).

Site Location	2014		2017	
	Summer	Winter	Spring	Summer
College Woods	11.3	6.8	8.0	5.0
Western Woods	12.1	25.8	13.6	8.8
Bachelor Preserve	13.0	13.7	18.2	9.5
Reinhart Preserve	9.6	30.0	7.9	7.8
Kramer Preserve	9.9	7.3	6.00	4.2

Table S3. Tree seedling (0.3 – 2 m tall) response variables across all sites and deer treatments (exclosure or control) and *L. maackii* treatments [present or removed (absent)] in the Miami University Natural Areas. Includes density (seedlings/m²), species richness, and abundance.

Site	Deer	Lonicera	Density	Richness	Abundance
Bachelor	Exclosure	Present	0.29	5	58
Bachelor	Exclosure	Absent	3.26	15	657
Bachelor	Control	Present	0.38	5	75
Bachelor	Control	Absent	1.26	10	251
College	Exclosure	Present	0.14	5	28
College	Exclosure	Absent	1.46	13	291
College	Control	Present	0.22	3	44
College	Control	Absent	0.16	6	32
Reinhart	Exclosure	Present	0.42	9	83
Reinhart	Exclosure	Absent	0.65	11	129
Reinhart	Control	Present	0.22	7	43
Reinhart	Control	Absent	0.12	6	24
Western	Exclosure	Present	0.26	10	51
Western	Exclosure	Absent	0.57	12	113
Western	Control	Present	0.1	7	20
Western	Control	Absent	0.05	3	10
Kramer	Exclosure	Present	0.13	4	26
Kramer	Exclosure	Absent	1.02	12	203
Kramer	Control	Present	0.02	2	3
Kramer	Control	Absent	0.02	2	4

Table S4. Number of shrubs by species across all sites and deer treatments (exclosure or control) and *L. maackii* treatments [present or removed (absent)] in the Miami University Natural Areas. See Table S5 for ‘shrub’ criteria. For *L. maackii* only the number of recruits (basal diameter of the largest stem ≤ 2 mm; Peebles-Spencer et al. 2018) is reported in all plots for all treatments.

Site	Deer	Lonicera	Native											Non-native								
			<i>Viburnum prunifolium</i>	<i>Rubus allegheniensis</i>	<i>Lindera benzoin</i>	<i>Ribes</i> spp.	<i>Viburnum dentatum</i>	<i>Euonymus atropurpureus</i>	<i>Rubus occidentalis</i>	<i>Sambucus canadensis</i>	<i>Sambucus nigra</i>	<i>Sambucus racemosa</i>	<i>Viburnum nudum</i>	<i>Ligustrum obtusifolium</i>	<i>Euonymus alatus</i>	<i>Lonicera maackii</i>	<i>Rosa multiflora</i>	<i>Lonicera morronii</i>	<i>Elaeagnus umbellata</i>	<i>Berberis thunbergii</i>	<i>Rubus idaeus</i>	<i>Frangula alnus</i>
Bachelor	Control	Absent	-	4	-	-	-	-	-	-	-	-	-	1	1	7	3	-	-	-	-	-
College	Control	Absent	2	52	-	-	-	-	-	-	-	-	-	-	-	5	16	-	2	2	2	-
Reinhart	Control	Absent	1	-	-	2	-	-	-	-	-	-	88	3	7	9	-	10	-	-	-	-
Western	Control	Absent	-	-	-	-	-	-	-	-	-	-	2	-	21	1	-	-	-	-	-	-
Kramer	Control	Absent	1	10	11	-	1	-	-	-	-	-	1	-	5	-	-	-	-	-	-	-
Bachelor	Control	Present	-	-	-	2	-	-	-	-	-	-	9	-	0	-	-	-	-	-	-	-
College	Control	Present	-	-	-	-	-	-	-	-	-	-	13	2	3	2	-	-	-	-	-	-
Reinhart	Control	Present	2	-	-	1	-	-	-	-	-	-	1	42	2	10	5	9	3	-	-	2
Western	Control	Present	1	1	-	-	-	-	-	-	-	-	-	-	19	-	-	-	-	-	-	-
Kramer	Control	Present	-	1	9	-	-	-	-	-	-	-	5	-	0	2	-	-	-	-	-	-
Bachelor	Exclosure	Absent	-	-	-	-	-	1	-	-	-	-	11	5	5	-	-	1	-	-	-	-
College	Exclosure	Absent	32	-	-	-	-	-	-	-	-	-	32	63	9	4	-	2	-	2	-	-
Reinhart	Exclosure	Absent	-	-	-	18	22	-	3	-	-	-	164	3	3	15	13	1	-	-	-	-
Western	Exclosure	Absent	1	-	-	-	-	-	-	-	-	-	15	16	8	-	-	1	-	-	-	-
Kramer	Exclosure	Absent	14	5	4	-	2	1	-	-	2	-	-	63	2	4	-	-	7	1	-	-
Bachelor	Exclosure	Present	10	-	-	-	-	13	-	-	-	-	3	-	2	-	-	-	-	-	-	-
College	Exclosure	Present	2	-	-	-	-	-	-	-	-	-	1	8	1	-	-	-	-	-	-	-
Reinhart	Exclosure	Present	4	-	-	5	1	-	-	-	-	-	292	2	3	10	7	1	-	-	-	-
Western	Exclosure	Present	-	-	-	-	-	1	-	3	-	-	3	3	3	-	-	-	-	-	-	-
Kramer	Exclosure	Present	5	-	6	-	1	-	-	-	-	1	-	68	2	0	-	-	-	-	-	-

Table S5. Total shrub response variables across all sites and deer treatments (exclosure or control) and *L. maackii* treatments [present or removed (absent)] in the Miami University Natural Areas. Includes density (shrubs/m²), species richness, and abundance. Includes all shrubs (excluding *L. maackii*) taller than 0.3 m. Stems within 10 cm of each other were counted as being from the same individual shrub.

Site	Deer	Lonicera	Density	Richness	Abundance
Bachelor	Exclosure	Present	0.13	3	26
Bachelor	Exclosure	Absent	0.11	5	22
Bachelor	Control	Present	0.06	2	11
Bachelor	Control	Absent	0.05	4	9
College	Exclosure	Present	0.06	3	11
College	Exclosure	Absent	0.68	6	136
College	Control	Present	0.09	3	17
College	Control	Absent	0.38	6	76
Reinhart	Exclosure	Present	1.63	7	326
Reinhart	Exclosure	Absent	1.28	9	255
Reinhart	Control	Present	0.35	9	69
Reinhart	Control	Absent	0.57	6	114
Western	Exclosure	Present	0.05	4	10
Western	Exclosure	Absent	0.18	5	36
Western	Control	Present	0.01	2	2
Western	Control	Absent	0.02	2	3
Kramer	Exclosure	Present	0.44	6	87
Kramer	Exclosure	Absent	0.52	10	103
Kramer	Control	Present	0.09	4	17
Kramer	Control	Absent	0.12	5	24

Table S6. Changes from 2015 to 2021 in understory tree (taller than 2 m with DBH<10 cm in 2015) species richness and abundance in each half-plot in the Miami University Natural Areas.

Site	Deer	Lonicera	ΔRichness	ΔAbundance
Bachelor	Exclosure	Present	1	1
Bachelor	Exclosure	Absent	4	6
Bachelor	Control	Present	-3	11
Bachelor	Control	Absent	0	18
College	Exclosure	Present	0	-1
College	Exclosure	Absent	1	1
College	Control	Present	-1	0
College	Control	Absent	0	3
Reinhart	Exclosure	Present	-1	7
Reinhart	Exclosure	Absent	3	12
Reinhart	Control	Present	-3	-9
Reinhart	Control	Absent	-2	-9
Western	Exclosure	Present	0	-3
Western	Exclosure	Absent	0	0
Western	Control	Present	0	-3
Western	Control	Absent	0	-1
Kramer	Exclosure	Present	0	-2
Kramer	Exclosure	Absent	0	-4
Kramer	Control	Present	0	1
Kramer	Control	Absent	0	-4

Table S7. Total vine response variables across all sites and deer treatments (exclosure or control) and *L. maackii* treatments [present or removed (absent)] in the Miami University Natural Areas. Includes density (vines/m²), species richness, and abundance of vines taller than 0.3 m.

Site	Deer	Lonicera	Density	Richness	Abundance
Bachelor	Exclosure	Present	0.03	2	6
Bachelor	Exclosure	Absent	0.24	4	48
Bachelor	Control	Present	0.05	3	9
Bachelor	Control	Absent	0.13	3	26
College	Exclosure	Present	0.03	3	6
College	Exclosure	Absent	0.47	5	93
College	Control	Present	0.01	1	1
College	Control	Absent	0	0	0
Reinhart	Exclosure	Present	0.02	3	4
Reinhart	Exclosure	Absent	0.07	6	13
Reinhart	Control	Present	0.02	3	3
Reinhart	Control	Absent	0.02	2	3
Western	Exclosure	Present	0.03	3	5
Western	Exclosure	Absent	0.11	4	21
Western	Control	Present	0.36	5	71
Western	Control	Absent	0.23	3	46
Kramer	Exclosure	Present	0.01	1	2
Kramer	Exclosure	Absent	0.14	2	27
Kramer	Control	Present	0.01	3	2
Kramer	Control	Absent	0	0	0

Table S8. Statistics (t , numerator df , and unadjusted P) for split-plot ANOVAs of variables analyzed by lmerTest, which uses Satterthwaites' df method (Kuznetsova et al. 2017). # indicates variable was log-transformed. Adjusted P values (adjusted for false discovery rate) are in Tables 1 and 4.

		Deer treatment			<i>L. maackii</i> treatment			Interaction		
		t	df	P	t	df	P	t	df	P
Richness	tree seedlings	5.004	12	0.000	-0.417	12.000	0.684	-2.645	12.000	0.021
	shrubs	2.762	9.699	0.036	-0.739	8.000	0.530	-1.567	8.000	0.216
Density	tree seedlings#	4.208	6.876	0.004	0.052	7.999	0.960	-3.006	7.999	0.016
	shrubs#	2.795	9.847	0.019	-1.212	8.000	0.260	-0.337	8.000	0.745
	Δ understory trees	0.347	9.109	0.736	-0.843	8.000	0.414	-0.511	8.000	0.623
	<i>L. maackii</i> recruits	-1.252	5.163	0.210	-1.127	8.000	0.260	-1.925	8.000	<i>0.054</i>
Modified canopy cover index	0.3m above ground	3.008	9.000	0.015	1.105	9.000	0.298	-0.216	9.000	0.834
Richness	native species	-0.421	15.215	0.680	-1.078	8	0.313	-2.117	8	0.067
	non-native species	1.376	12.000	0.194	0.229	12.000	0.822	-1.46	12.000	0.170
Cover	bare ground	-3.822	11.999	0.002	0.552	11.998	0.591	0.307	11.998	0.764
	native	4.019	12	0.002	-0.376	12	0.714	-4.016	12	0.002
	vines#	1.627	14.335	0.126	-1.3	8	0.230	-2.252	8	0.054
	graminoids	-2.565	12	0.025	-0.605	12	0.556	-1.192	12	0.256
	SprPer#	0.73	16	0.476	-0.687	16	0.502	-1.443	16	0.168

Table S9. Statistics (F and unadjusted P) for split-plot ANOVAs on ranks, using the ARTool package in R. $df = 1, 1$ for each test. Adjusted P values (adjusted for false discovery rate) are in Tables 1 and 4.

		Deer treatment		<i>L. maackii</i> treatment		Interaction	
		F	P	F	P	F	P
Richness	Δ understory trees	7.851	0.049	4.539	0.066	0.050	0.828
Density	vines	0.518	0.453	7.447	0.004	9.874	0.005
Cover	non-native	0.725	0.443	3.780	0.088	3.065	0.118
	tree seedlings	13.309	0.022	5.503	0.047	6.330	0.036
	shrubs	3.699	0.127	4.317	0.071	1.090	0.327
	annuals	36.075	0.004	0.000	1.000	0.060	0.812
	SumPer	0.881	0.401	3.648	0.093	0.127	0.731

Figure S1. Plot of mean basal area (cm^2) of *Lonicera maackii* for 2010, 2015, and 2021 in half-plots where deer had access or were excluded and *L. maackii* was not removed. For each treatment combination, mean \pm (SE) of the five sites is plotted. Data from 2010 and 2015 from Peebles-Spencer et al. (2018).

