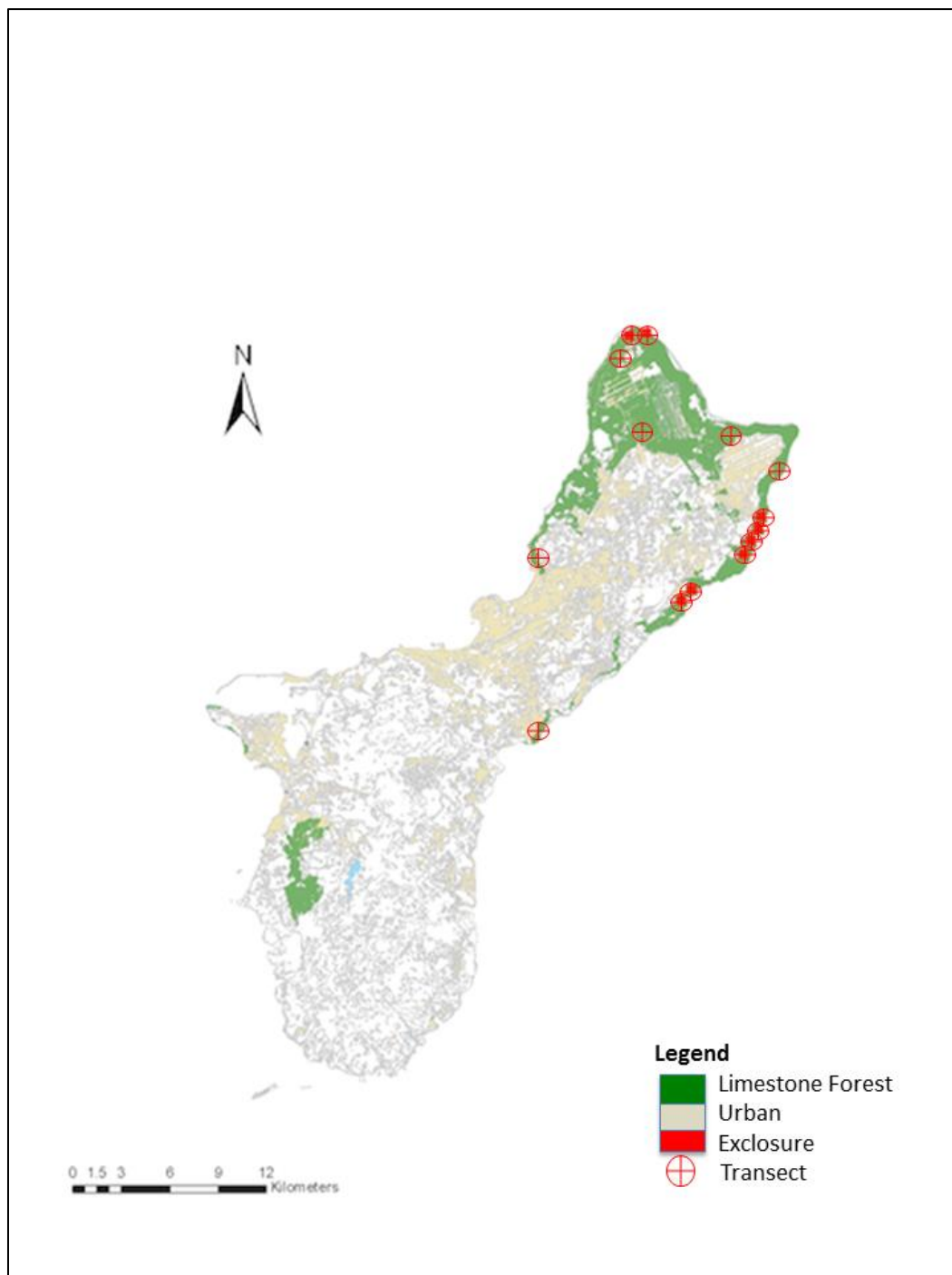
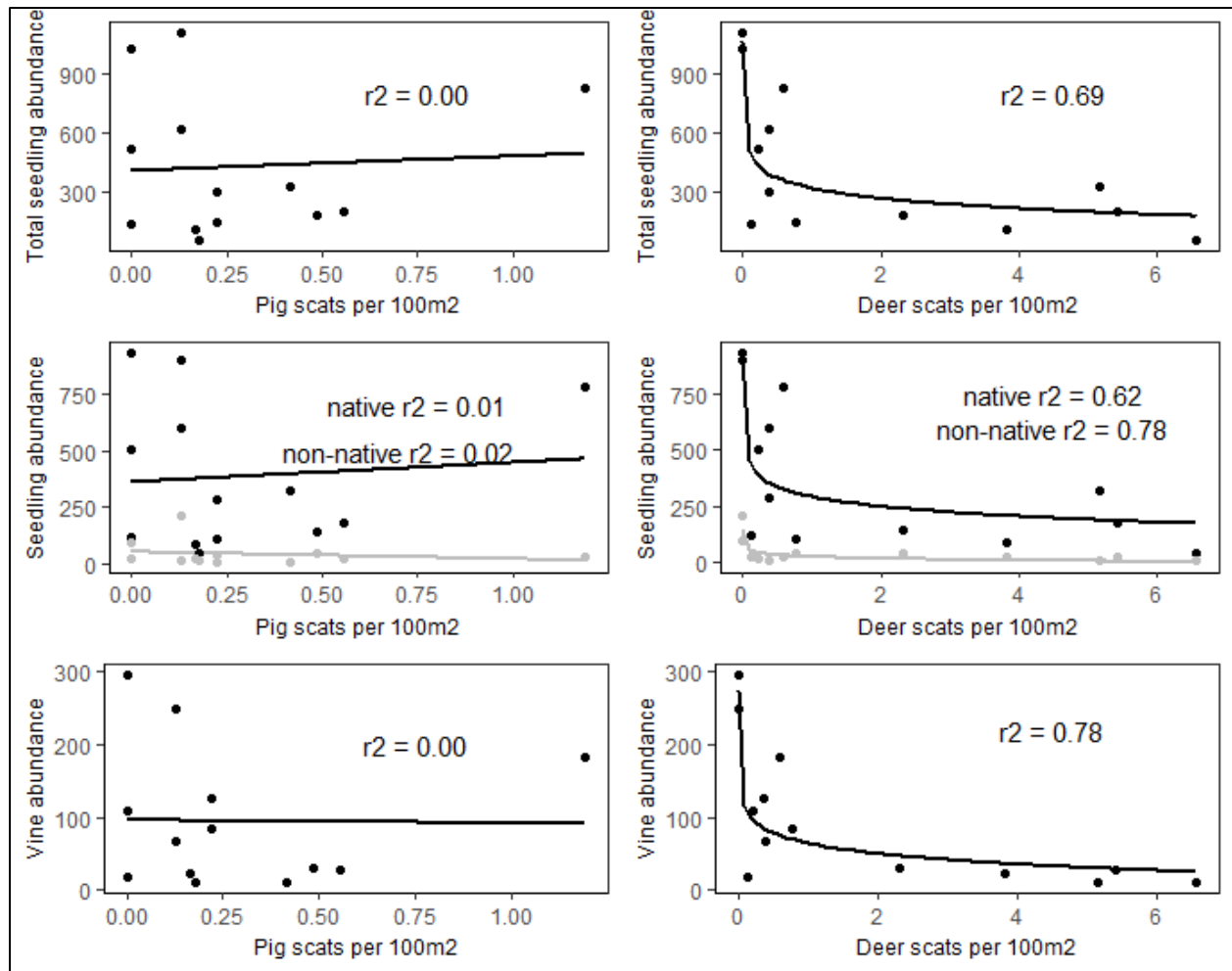


Supplementary Section 1: Sites



Supplementary Figure 1. Location of eight exclosures and 14 transects in Guam's limestone karst forests.

**Supplementary Section 2:** Plots after removing highest deer density site.



Supplementary Figure 2. Results from vegetation and scat surveys dropping “Tartop” site that had highest Deer scats per 100m<sup>2</sup> value. Although scale of the x-axis is slightly smaller in the right-hand panel, trends and  $r^2$  values are almost identical to original results (see Figure 4 in manuscript).

**Supplementary Section 3:** Comparisons of baseline characteristics of seedling plots chosen for fenced and ungulate treatments.

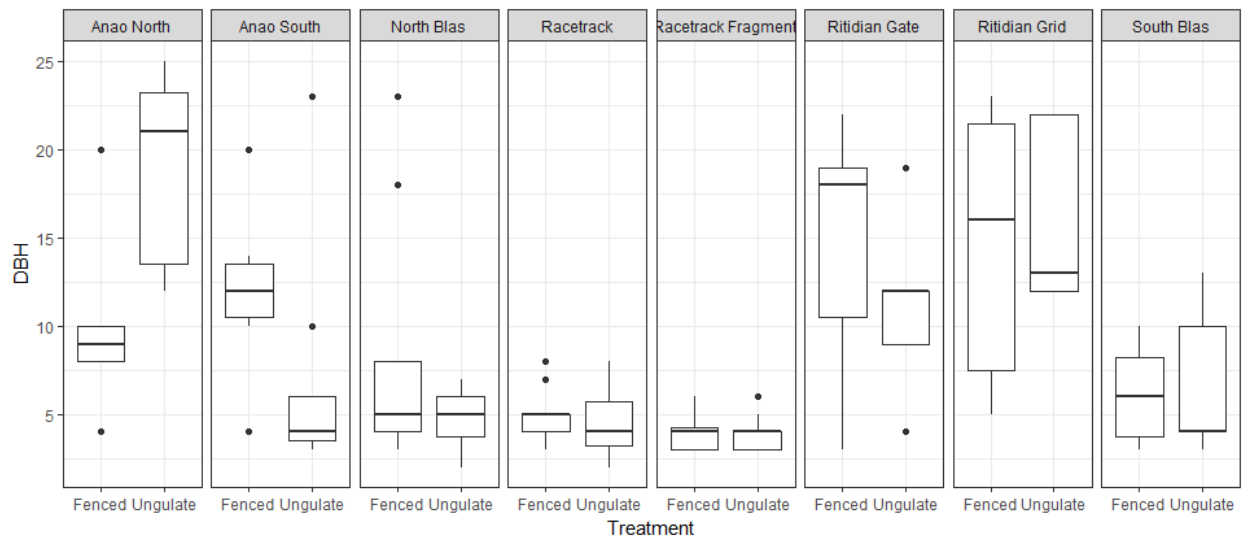
Supplementary Table 1: Comparison of paired plots at each site, using number of adult trees, average diameter at breast height (dbh), canopy cover, and average adult tree height.

Site	Fenced				Unfenced			
	# Adult trees	Avg dbh (cm)	Canopy cover	Avg height (m)	# Adult trees	Avg dbh (cm)	Canopy cover	Avg height (m)
Ritidian Grid	6	14.67	0.82	9.17	5	16.2	0.84	8.3
Ritidian Gate	7	14.57	0.9	8.71	5	11.2	0.85	7.6
Anao North	6	10	0.84	10.6	8	19	0.84	11.06
Anao South	7	12	0.73	9.43	11	6.45	0.79	9.43
North Blas	13	8.23	0.85	7.62	6	4.75	0.82	7.75
South Blas	8	6.13	0.76	6.88	6	6.67	0.74	7.67
Racetrack	14	4.93	0.9	6.21	10	4.93	0.9	6.65
Racetrack Fragment	12	4	0.88	7.46	9	4	0.89	6.67

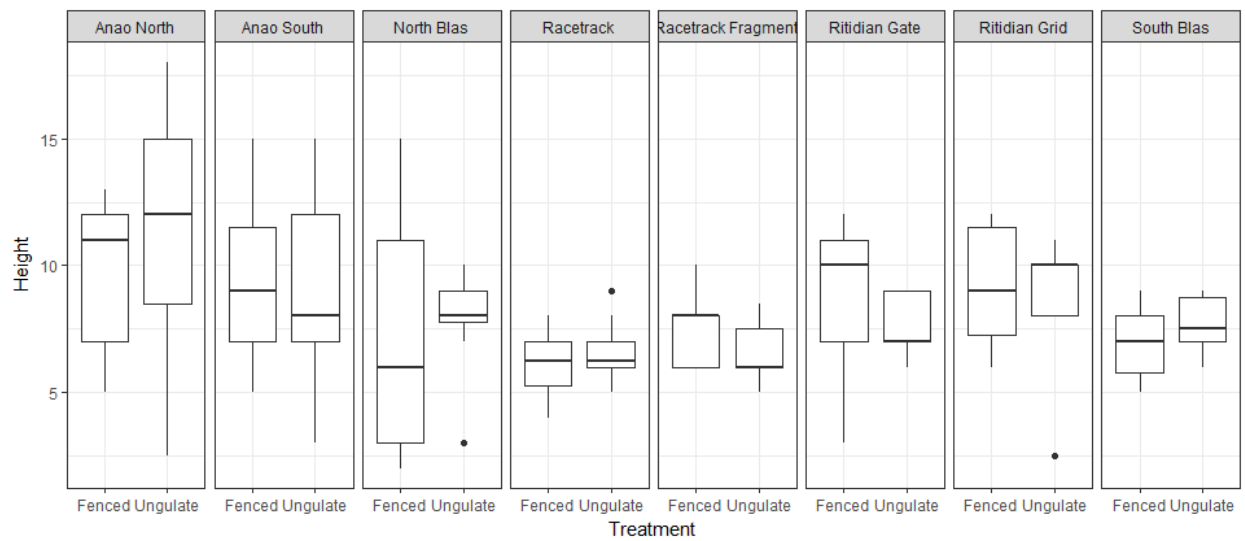
Supplementary Table 2: We used linear mixed effects models with least square means posthoc tests to assess if the number of adult trees, proportion canopy cover, diameter at breast height of adult trees, and adult tree height differed significantly between treatments. We report output from the lsmeans tests below. We determined that these parameters do not differ significantly between seedling plots at each site.

Parameter	Contrast values (Fenced – Unfenced)				
	Lsmean	Df	SE	t-ratio	p-value
# adult trees	1.63	7	1.21	1.34	0.22
Canopy cover	0.00	7	0.01	0.11	0.92
Height	-0.01	127.77	0.50	-0.02	0.98
DBH	0.48	126.41	0.86	0.56	0.57

A.



B.



Supplementary Figure 3. Comparisons of DBH (a) and height (b) in adult trees in paired plots.

Supplementary Table 3. We included qualitative descriptions of the sites in the table below.

Site		Fenced	Unfenced/Ungulate
<b>Ritidian Grid</b>	<b>Substrate</b>	Solid karst formations in southeast corner of plot, large amounts of <i>Ochrosia oppositifolia</i> leaf litter	Mostly flat with scattered limestone rocks 10-20 cm in diameter, mixed leaf litter
	<b>Slope</b>	0	0
	<b>Species of adult trees</b>	<i>Ochrosia oppositifolia</i> , <i>Aglaia mariannensis</i> , <i>Meiogyne cylindrocarpa</i>	<i>Ochrosia oppositifolia</i> , <i>Psychotria mariana</i> , <i>Cycas micronesica</i>
<b>Ritidian Gate</b>	<b>Substrate</b>	Mostly 5-10cm-diameter rocks with few large, 50-cm-high boulders, <20% exposed red soil	Few large, 50-cm-high boulders, <20% exposed red soil, mostly 5-10cm-diameter rocks
	<b>Slope</b>	0	slight downward slope (<5 degrees) towards NW
	<b>Species of adult trees</b>	<i>Ochrosia oppositifolia</i> , <i>Aglaia mariannensis</i> , <i>Triphasia trifolia</i>	<i>Aglaia mariannensis</i> , <i>Mammea odorata</i> , <i>Ochrosia oppositifolia</i>
<b>Anao North</b>	<b>Substrate</b>	very rocky, no soil visible, rocks from 5 - 50-cm in diameter	very rocky, no soil visible, rocks from 5 - 50-cm in diameter
	<b>Slope</b>	0	0
	<b>Species of adult trees</b>	<i>Ochrosia oppositifolia</i> , <i>Meiogyne cylindrocarpa</i> ( <i>Macaranga thompsonii</i> , out of plot, but canopy overhanging plot)	<i>Ochrosia oppositifolia</i> , <i>Cycas micronesica</i> , <i>Macaranga thompsonii</i>
<b>Anao South</b>	<b>Substrate</b>	60% of ground cover is large rocks >20cm in diameter, some (~20% substrate) exposed red dirt	very rocky, loose rocks 10-50cm in diameter, small amounts (~10-15%) of exposed red dirt
	<b>Slope</b>	flat	slight downward slope (<5 degrees) towards east
	<b># adult trees</b>	7	11
	<b>Species of adult trees</b>	<i>Mammea odorata</i> , <i>Aglaia mariannensis</i> , <i>Meiogyne cylindrocarpa</i> , <i>Ochrosia oppositifolia</i>	<i>Mammea odorata</i> , <i>Ochrosia oppositifolia</i> , <i>Cynometra ramiflora</i> , <i>Meiogyne cylindrocarpa</i>
<b>North Blas</b>	<b>Substrate</b>	very rocky, no soil visible, rocks approx. 50cm in diameter	very rocky, no soil visible, rocks approx. 50cm in diameter
	<b>Slope</b>	slight slope (<5 degs) downward towards NE, tower karst intermittent on all sides	in slight depression between towers of karst on north and south sides

	<b>Species of adult trees</b>	<i>Aglaia mariannensis, Cynometra ramiflora, Morinda citrifolia, Macaranga thompsonii, Syzigium thompsonii</i>	<i>Aglaia mariannensis, Meiohyne cylindrocarpa, Mammea odorata</i>
<b>South Blas</b>	<b>Substrate</b>	very rugged; large, solid rocks on south side of plot, no soil showing	rugged, no soil showing
	<b>Slope</b>	0	0
	<b>Species of adult trees</b>	<i>Meiohyne cylindrocarpa, Ochrosia mariannensis</i>	<i>Meiohyne cylindrocarpa, Ochrosia mariannensis, Macaranga thompsonii</i>
<b>Racetrack</b>	<b>Substrate</b>	moderate karst, scattered boulders 0.5-m in diameter	moderate karst, scattered boulders and rocks 0.2 to 0.5-m in diameter
	<b>Slope</b>	0	0
	<b>Species of adult trees</b>	<i>Eugenia reinwardtiana</i>	<i>Eugenia reinwardtiana, Meiohyne cylindrocarpa</i>
<b>Racetrack Fragment</b>	<b>Substrate</b>	very rocky, high amount of <i>Eugenia</i> leaf litter	very rocky, high amount of <i>Eugenia</i> leaf litter
	<b>Slope</b>	0	0
	<b>Species of adult trees</b>	<i>Eugenia reinwardtiana, Aglaia mariannensis</i>	<i>Eugenia reinwardtiana</i>

**Supplementary Section 4:** Model selection for linear models of vegetation characteristics explained by pig and deer scat abundance. Deer scat abundance was consistently part of the best fit model to explain seedling abundances and vine abundance, while the models with pig scat abundance and both pig and deer scat abundance were not.

Supplementary Table 4. Total seedlings

	K	AICc	Delta_AICc	AICcWt	Cum.Wt	LL
<b>Deer</b>	<b>3</b>	<b>206.06</b>	<b>0.00</b>	<b>0.81</b>	<b>0.81</b>	<b>-98.83</b>
Deer + Pigs	4	209.55	3.49	0.14	0.96	-98.56
Pigs	3	211.90	5.84	0.04	1.00	-101.75

Supplementary Table 5. Native seedlings

	K	AICc	Delta_AICc	AICcWt	Cum.Wt	LL
<b>Deer</b>	<b>3</b>	<b>202.53</b>	<b>0.00</b>	<b>0.81</b>	<b>0.81</b>	<b>-97.07</b>
Deer + Pigs	4	205.93	3.40	0.15	0.95	-96.74
Pigs	3	208.26	5.73	0.05	1.00	-99.93

Supplementary Table 6. Exotic seedlings

	K	AICc	Delta_AICc	AICcWt	Cum.Wt	LL
<b>Deer</b>	<b>3</b>	<b>156.83</b>	<b>0.00</b>	<b>0.72</b>	<b>0.72</b>	<b>-74.22</b>
Pigs	3	159.64	2.81	0.18	0.90	-75.62
Deer + Pigs	4	160.80	3.97	0.10	1.00	-74.18

Supplementary Table 7. Vines

	K	AICc	Delta_AICc	AICcWt	Cum.Wt	LL
<b>Deer</b>	<b>3</b>	<b>167.50</b>	<b>0.00</b>	<b>0.85</b>	<b>0.85</b>	<b>-79.55</b>
Deer + Pigs	4	171.35	3.85	0.12	0.98	-79.45
Pigs	3	174.59	7.09	0.02	1.00	-83.10