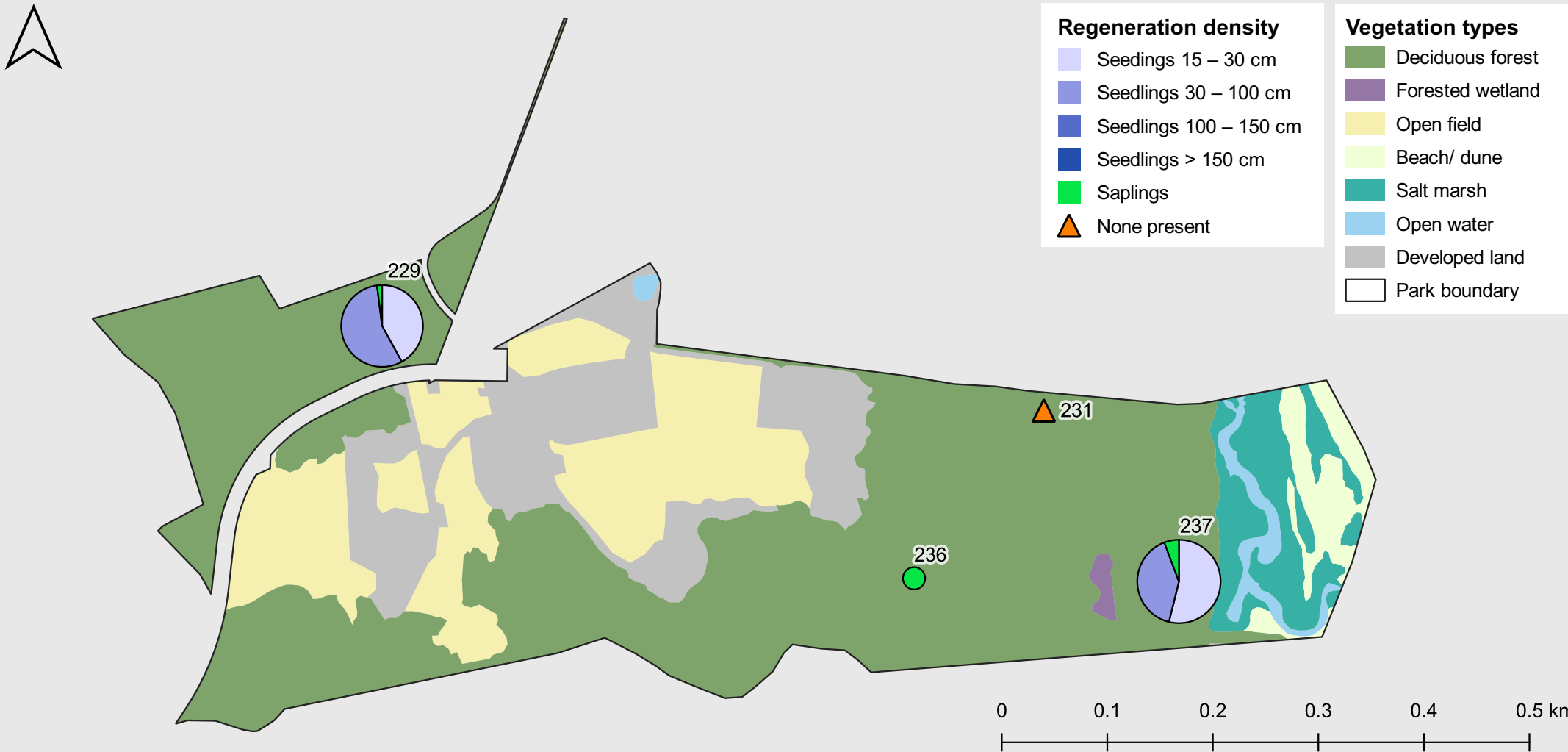




Map 1. Tree Regeneration By Size Class

Tree regeneration stem densities by size class in forest plots from the most recent survey cycle (2016 – 2019). The plots are sampled every four years. Pie size is proportional to plot-level regeneration density. Densities range from 0 to 0.3 stem/sq.m for an individual size class and only include native canopy-forming species. Seedlings are individuals ≥ 15 cm tall and < 1 cm diameter at breast height (DBH). Saplings are individuals ≥ 1 cm and < 10 cm DBH. Reporting Date: 08/20/2020.





Map 2. Tree Regeneration By Cycle

Tree regeneration stem densities, including seedlings and saplings, in forest plots sampled from 2008 – 2019. The plots are sampled every four years. The number of bars per plot corresponds to the number of times the plot has been sampled. Densities range from 0 to 0.6 stems/sq.m, and only include native canopy-forming species. Reporting Date: 08/20/2020.

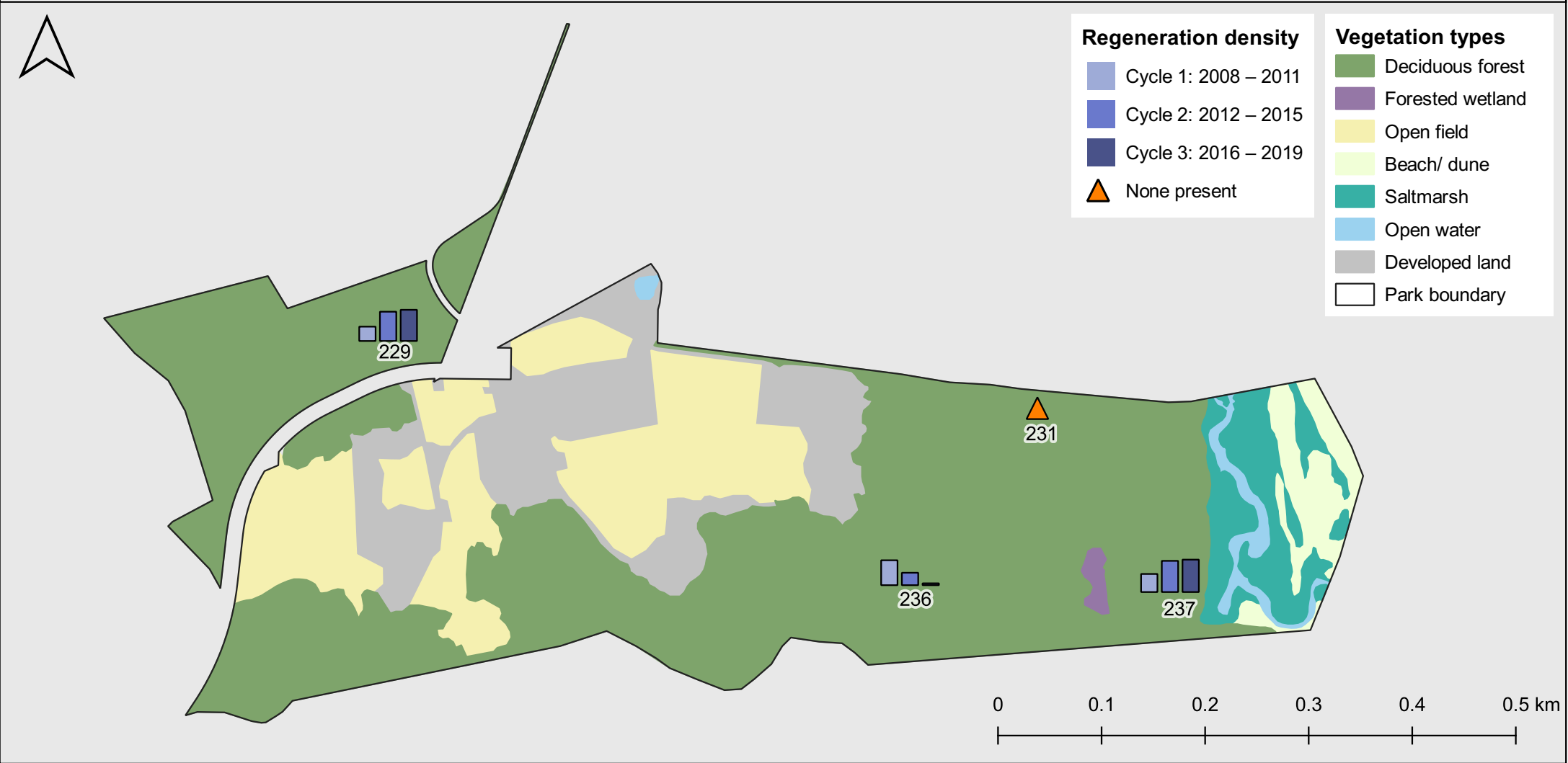


Table 1. Average plot-level seedling and sapling stem densities (stems/sq.m), and stocking index by cycle for Sagamore Hill National Historic Site. Only native canopy-forming species are included. Cycle 1 is 2008 – 2011, Cycle 2 is 2012 – 2015, Cycle 3 is 2016 – 2019. The stocking index quantifies whether current regeneration densities are sufficient to restock a forest canopy. The index is a weighted sum of seedling and sapling densities where larger seedling size classes get higher weights. Stocking index values below 2 indicate severely understocked regeneration. Forests in areas with high deer densities need a stocking index value of at least 8 to be sufficiently stocked. No plots meet this threshold.

Plot	Seedlings per sq. meter			Saplings per sq. meter			Stocking Index		
	Cycle 1	Cycle 2	Cycle 3	Cycle 1	Cycle 2	Cycle 3	Cycle 1	Cycle 2	Cycle 3
229	0.3	0.5	0.6	< 0.1	< 0.1	< 0.1	5.6	7.7	1.5
231	0	0	0	0	0	0	0	0	0
236	0.4	0.2	0	< 0.1	< 0.1	< 0.1	5.2	3.9	1.8
237	0.3	0.6	0.6	< 0.1	< 0.1	< 0.1	0.9	1.6	2.6

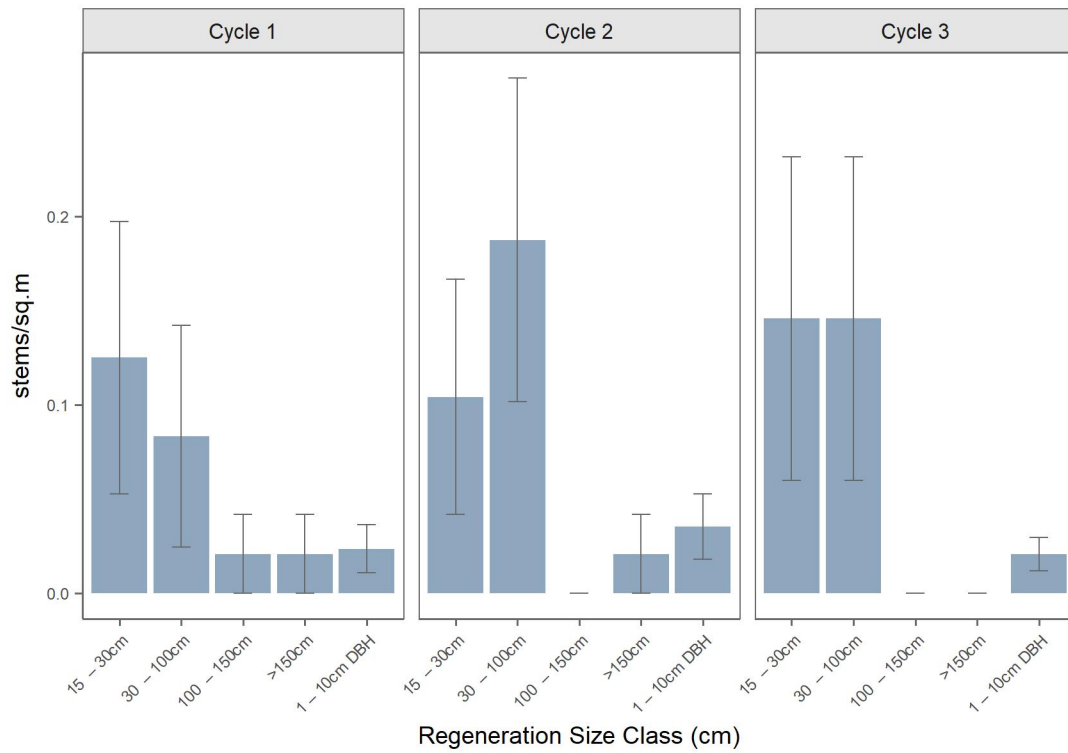


Figure 1. Stem density distribution by size class for seedlings and saplings in Sagamore Hill National Historic Site. increments. Cycle 1 is 2008 – 2011, Cycle 2 is 2012 – 2015, Cycle 3 is 2016 – 2019. Error bars are ± 1 SE.

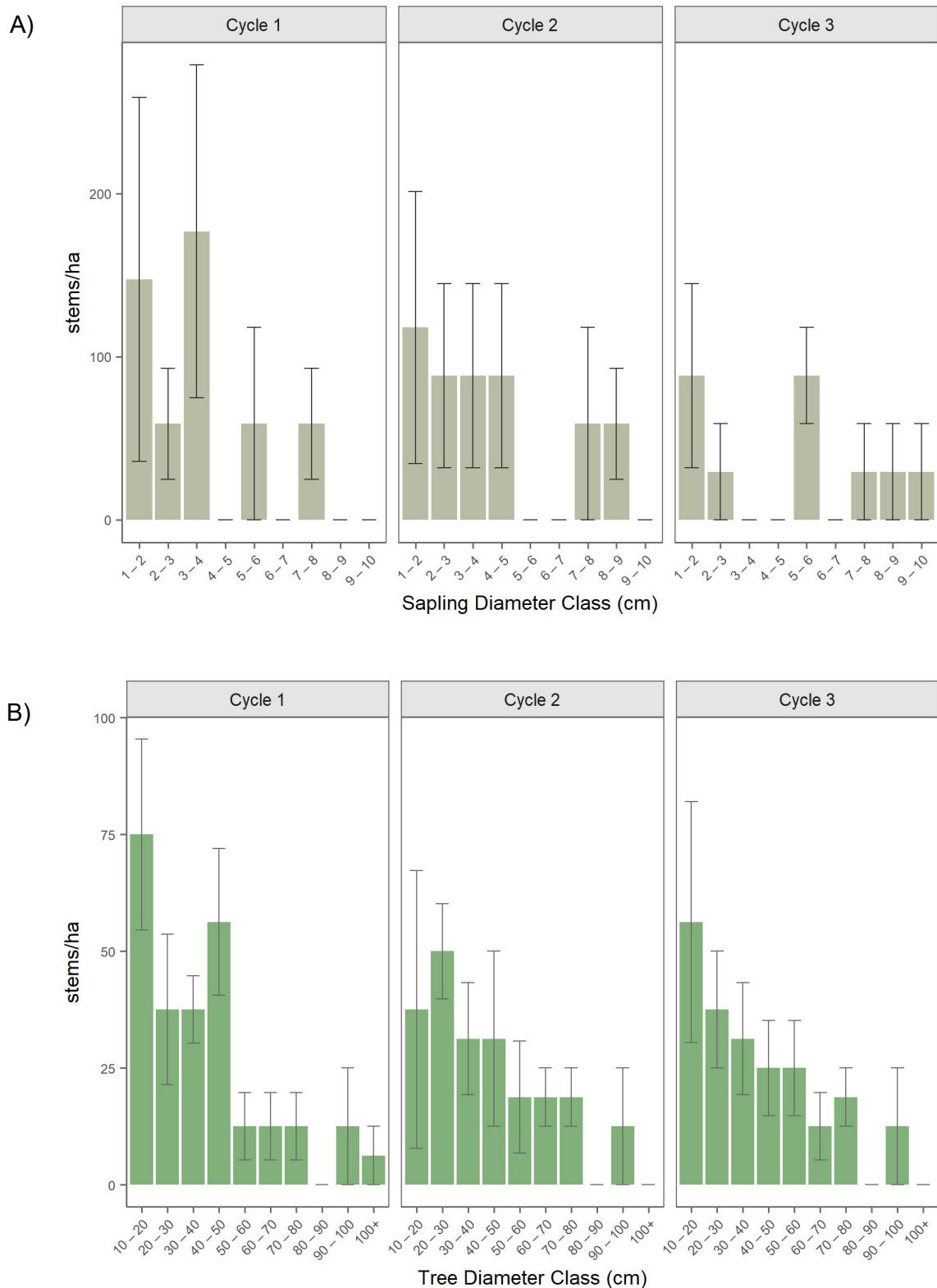
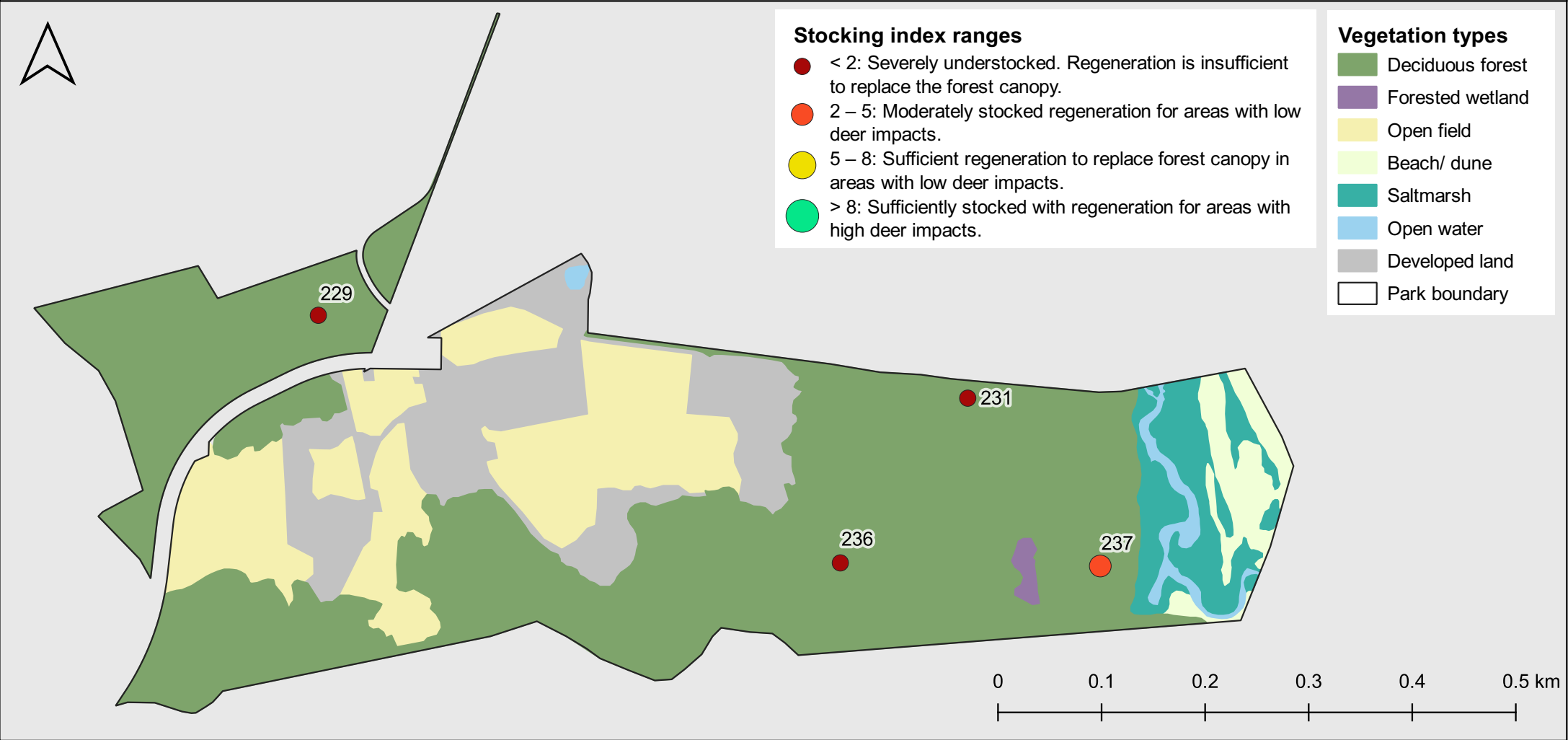


Figure 2. Sapling and tree density distributions for Sagamore Hill National Historic Site. Figure A shows sapling densities by diameter at breast height at 1 cm increments. Figure B shows tree density by diameter at breast height at 10 cm increments. Cycle 1 is 2008 – 2011, Cycle 2 is 2012 – 2015, Cycle 3 is 2016 – 2019. Error bars are ± 1 SE.



Map 3. Tree Regeneration Stocking Index

Regeneration stocking index for the most recent survey cycle (2016 – 2019). The plots are sampled every four years. The stocking index quantifies whether current regeneration densities are sufficient to restock a forest canopy. The index is a weighted sum of seedling and sapling densities where larger seedling size classes get higher weights. The stocking index only includes native canopy-forming species (range: 0 – 2.6). Values below 2 are severely understocked. Values above 8 are sufficiently stocked for areas with high deer abundance. See Table 1 for plot-level stocking values. Reporting Date: 08/20/2020.



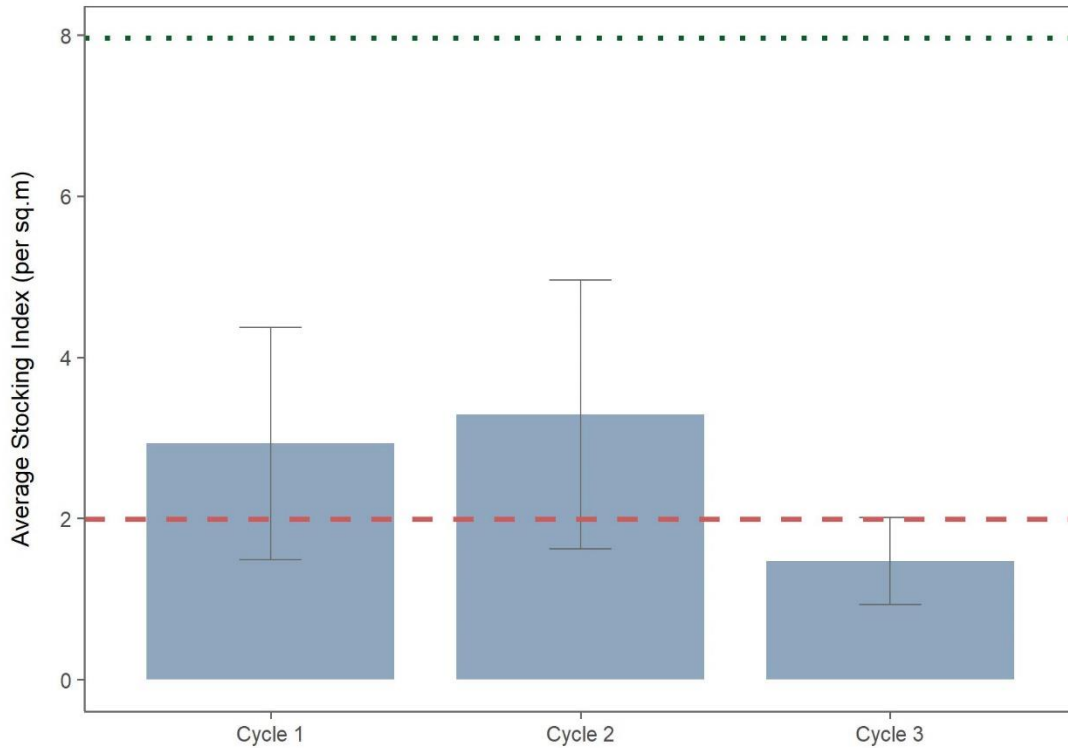
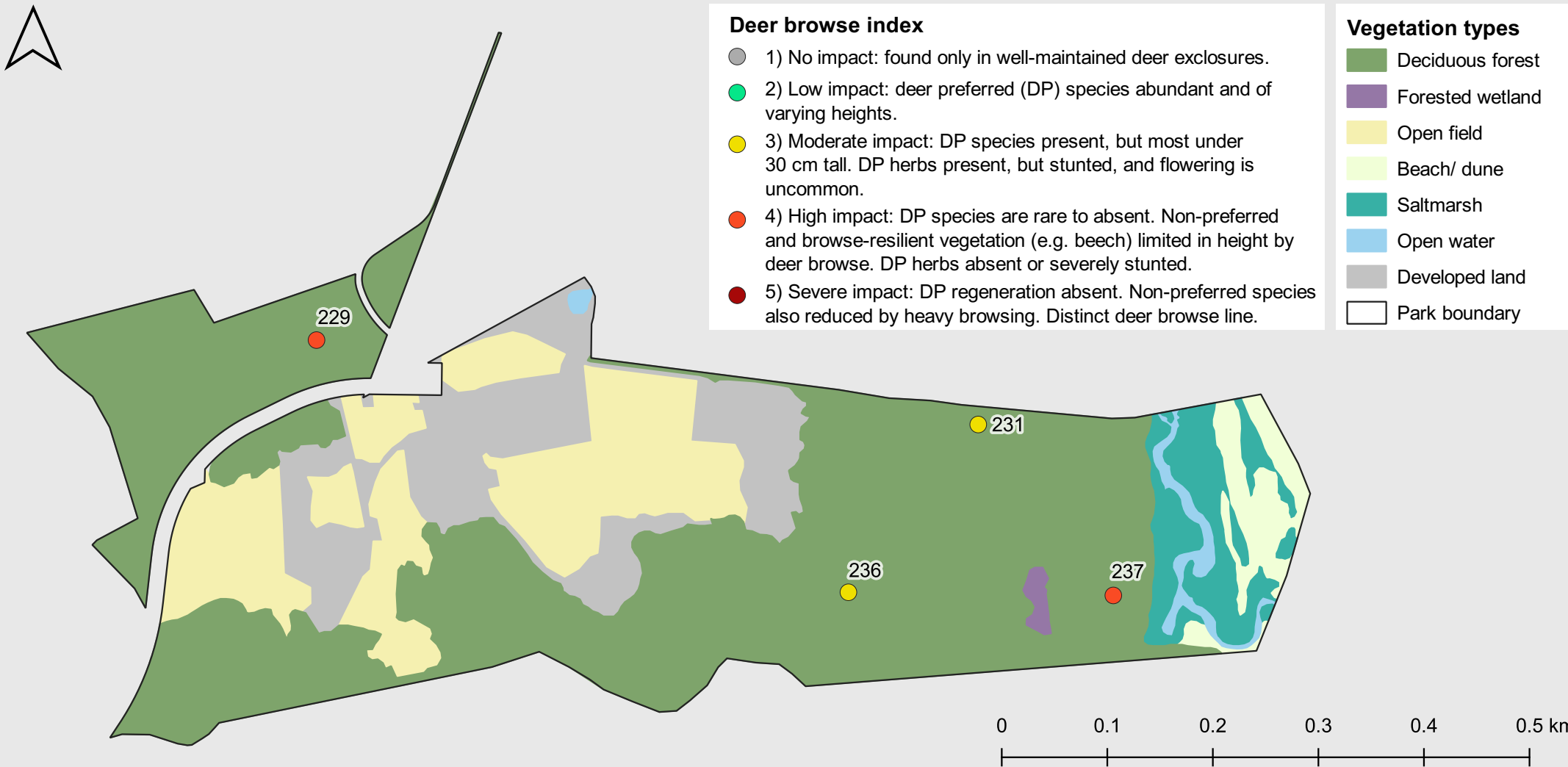


Figure 3. Regeneration stocking index averaged by cycle in Sagamore Hill National Historic Site. The index is a weighted sum of seedling and sapling densities where larger seedling size classes get higher weights. The stocking index only includes native canopy-forming species (range: 0 – 7.7). Values below 2 (red dashed line) are severely understocked. Values above 8 (green dotted line) are sufficiently stocked for areas with high deer abundance. Cycle 1 is 2008 – 2011, Cycle 2 is 2012 – 2015, Cycle 3 is 2016 – 2019. Error bars are ± 1 SE.



Map 4. Index of Deer Browse Impacts

Index of deer browse impacts observed in forest plots in the most recent survey cycle (2016 – 2019). The plots are sampled every four years. Deer browse impacts are assessed on a scale of 1 – 5, with 1 representing no impact and 5 representing severe impacts. Reporting Date: 08/20/2020.



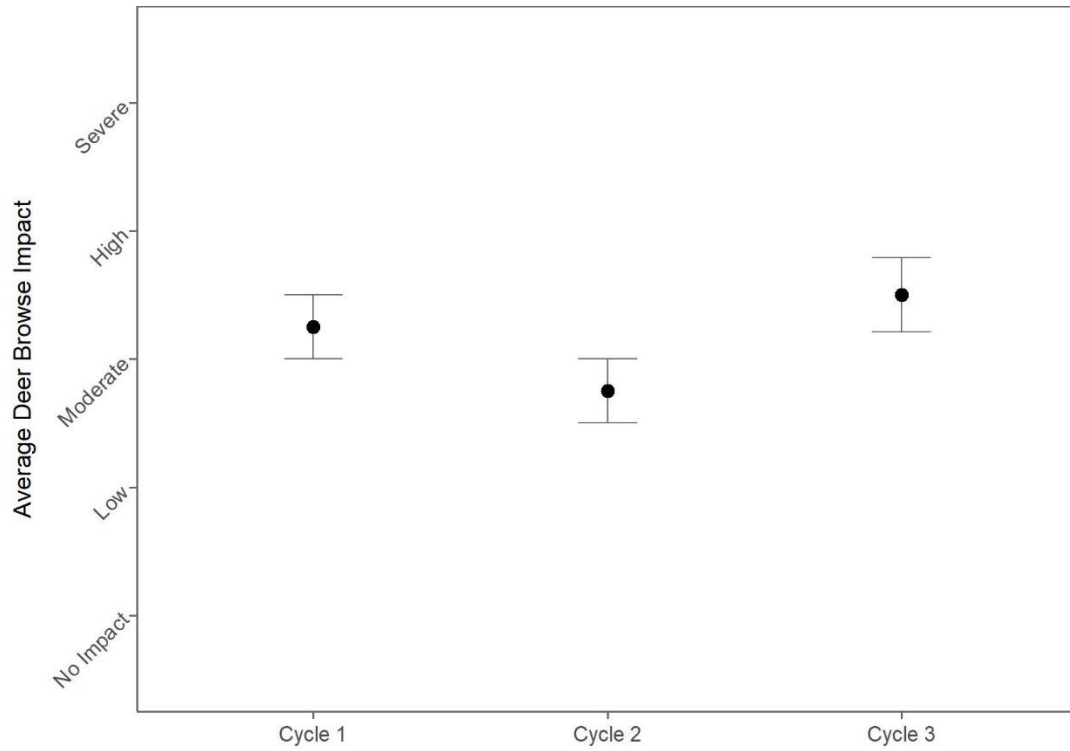
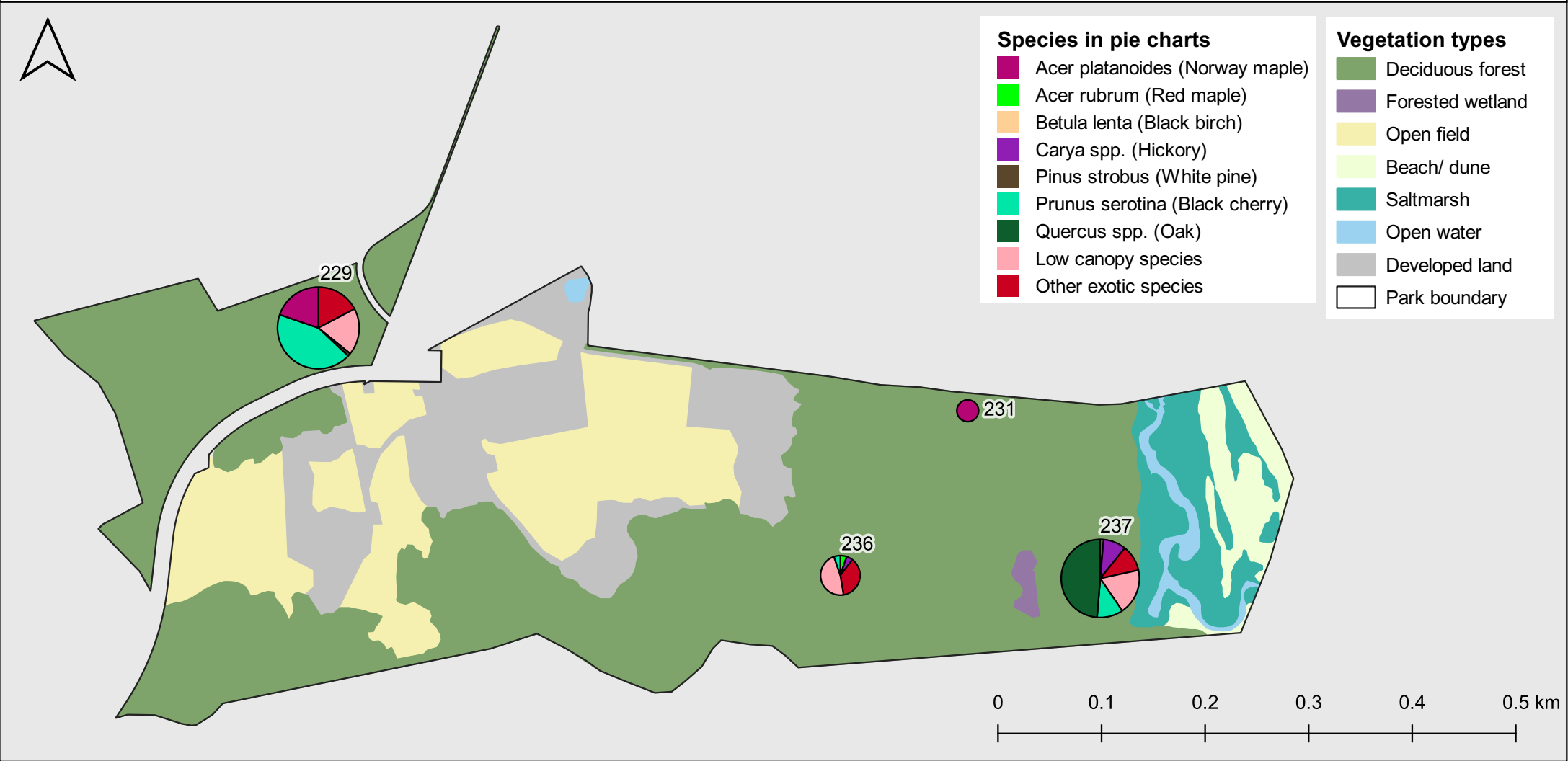


Figure 4. Average deer browse impact by cycle in Sagamore Hill National Historic Site. Deer browse impacts are assessed on a scale of 1 – 5, with 1 representing no impact and 5 representing severe impacts. Cycle 1 is 2009 – 2011, Cycle 2 is 2012 – 2015, Cycle 3 is 2016 – 2019. DBI was not collected until 2009. Error bars are ± 1 SE.



Map 5. Tree Regeneration by Composition

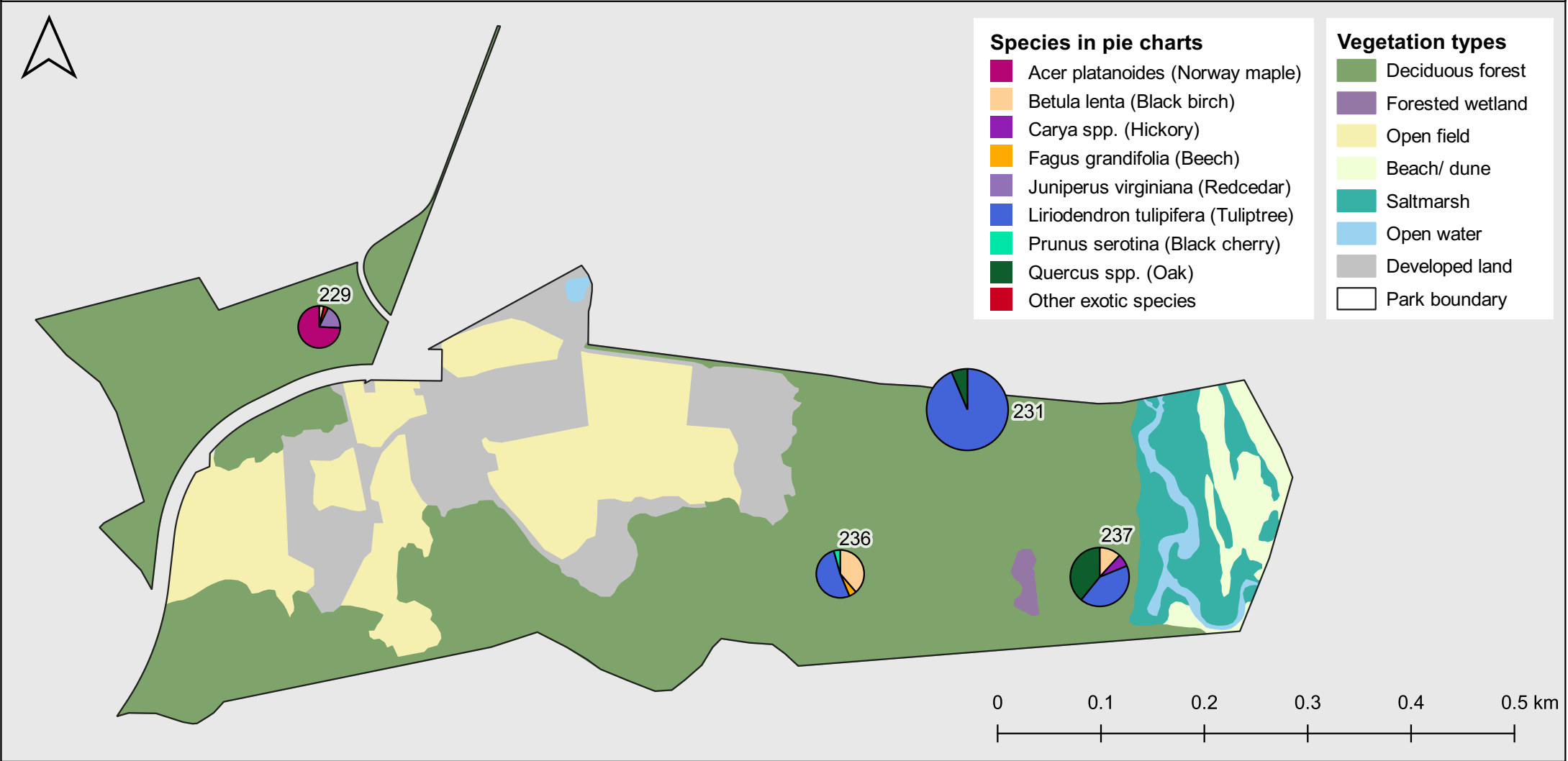
Tree regeneration stem densities, including seedlings and saplings, by species group observed in forest plots sampled in the most recent survey cycle (2016 – 2019). The plots are sampled every four years. Pie size is proportional to plot-level regeneration density. Densities range from 0 to 0.4 stem/sq.m for an individual species group. See <https://npsforveg.shinyapps.io/midn/> for more specific plot level information. Reporting Date: 08/20/2020.





Map 6. Tree Canopy Composition

Live basal area by species group observed in forest plots sampled in the most recent survey cycle (2016 – 2019). The plots are sampled every four years. Pie size is proportional to plot-level basal area. Basal areas range from 0 to 65.4 sq.m/ha for an individual species group. See <https://npsforveg.shinyapps.io/midn/> for more specific plot level information. Reporting Date: 08/20/2020.





Map 7. Invasive % Cover by Cycle

Average percent cover of invasive species observed in quadrats in forest plots sampled from 2008 – 2019. The plots are sampled every four years. Average invasive cover per plot ranges from < 0.1 to 5.6%. See Table 2 for % cover values. See Table 3 for a species list; only species monitored since 2007 were included in this metric. Reporting Date: 08/20/2020.

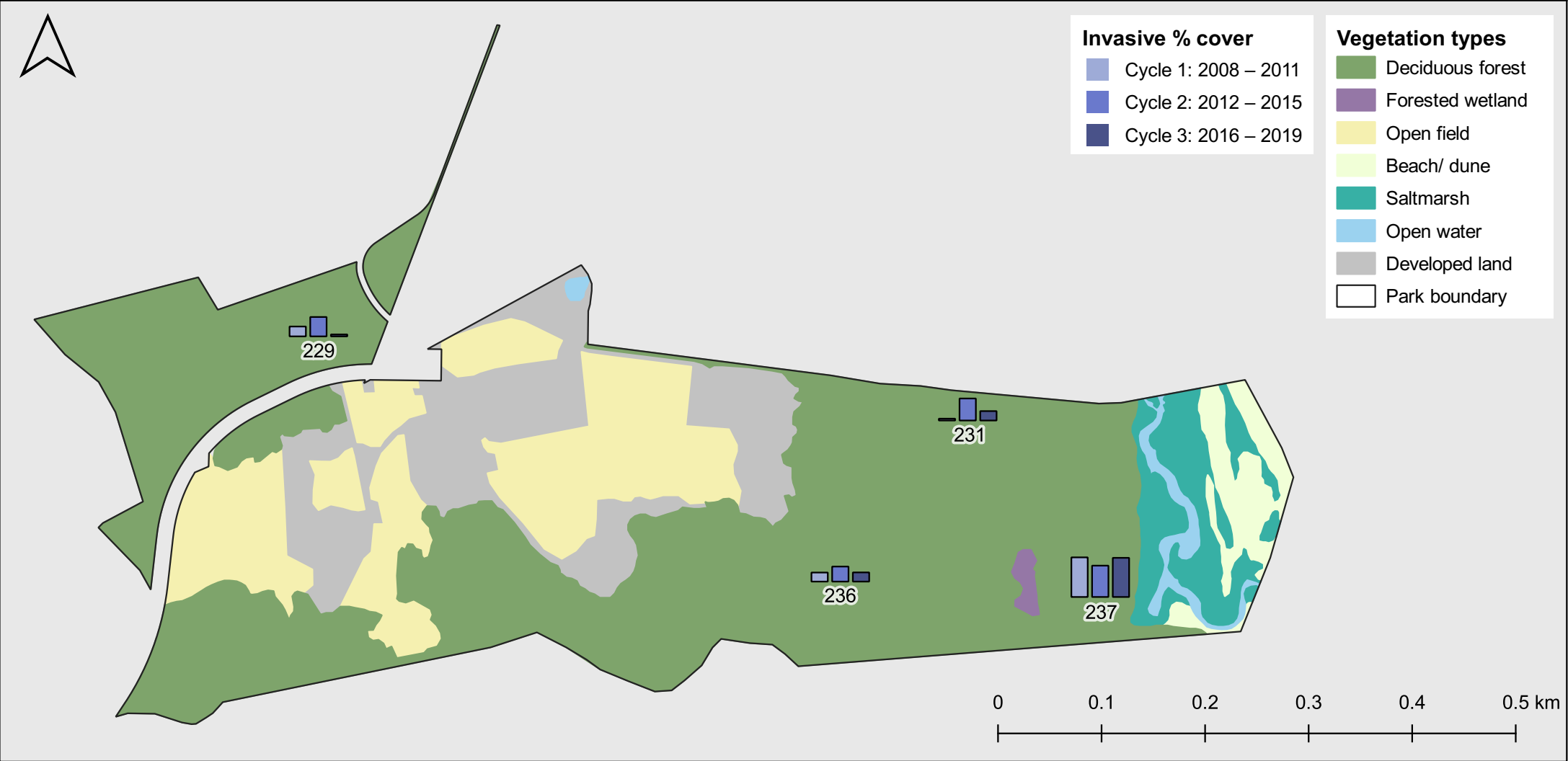


Table 2. Average % cover of invasive species detected in each plot by cycle in Sagamore Hill National Historic Site. Cycle 1 is 2008 – 2011, Cycle 2 is 2012 – 2015, Cycle 3 is 2016 – 2019. The plots are sampled every four years. See Table 3 for a species list; only species monitored since 2007 were included in this metric.

Plot	Average % cover		
	Cycle 1	Cycle 2	Cycle 3
229	1.4	2.8	0.3
231	0.3	3.1	1.3
236	1.3	2.1	1.3
237	5.6	4.5	5.6

Table 3. Number of plots where invasive species were detected by cycle in Sagamore Hill National Historic Site. Cycle 1 is 2008 – 2011, Cycle 2 is 2012 – 2015, Cycle 3 is 2016 – 2019. The plots are sampled every four years. Note that not all species have been monitored for the same amount of time, as indicated by the Year added column. Species that are exotic to the mid-Atlantic region, but not considered invasive are indicated by *.

Latin name	Common name	Year added	Number of plots with species present		
			Cycle 1	Cycle 2	Cycle 3
<i>Acer platanoides</i>	Norway maple	2007	3	4	3
<i>Alliaria petiolata</i>	Garlic mustard	2007	1	2	3
<i>Berberis thunbergii</i>	Japanese barberry	2007	1	1	1
<i>Celastrus orbiculatus</i>	Oriental bittersweet	2007	3	3	3
<i>Euonymus alatus</i> ¹	Burningbush	2019	1	3	3
<i>Euonymus fortunei</i>	Climbing euonymus	2007	1	0	1
<i>Hedera helix</i>	English ivy	2007	2	2	2
<i>Ligustrum</i> spp.	Privet	2009	0	3	4
<i>Lonicera</i> spp. - Exotic	Exotic bush honeysuckle	2007	2	0	0
<i>Lonicera japonica</i>	Japanese honeysuckle	2007	3	4	4
<i>Persicaria longiseta</i> *	Oriental lady's thumb	2009	0	1	1
<i>Rosa multiflora</i>	Multiflora rose	2007	1	3	3
<i>Rubus phoenicolasius</i>	Wine raspberry	2007	0	2	3
<i>Viburnum dilatatum</i>	Linden arrowwood	2019	0	3	2
<i>Vinca minor</i> *	Lesser periwinkle	2007	0	1	0
Number of plots sampled	-	-	4	4	4

¹*Euonymus alatus* was added to the indicator list for quadrats in 2019, but has also been monitored in microplots since 2007.



Map 8. Invasive % Cover by Species

Average percent invasive cover by species observed in quadrats in forest plots sampled in the most recent survey cycle (2016 – 2019). The plots are sampled every four years. Pie size is proportional to plot-level invasive cover. Average invasive cover ranges from 0 to 3.5% for an individual species. See Table 3 for more information. Reporting Date: 08/20/2020.

