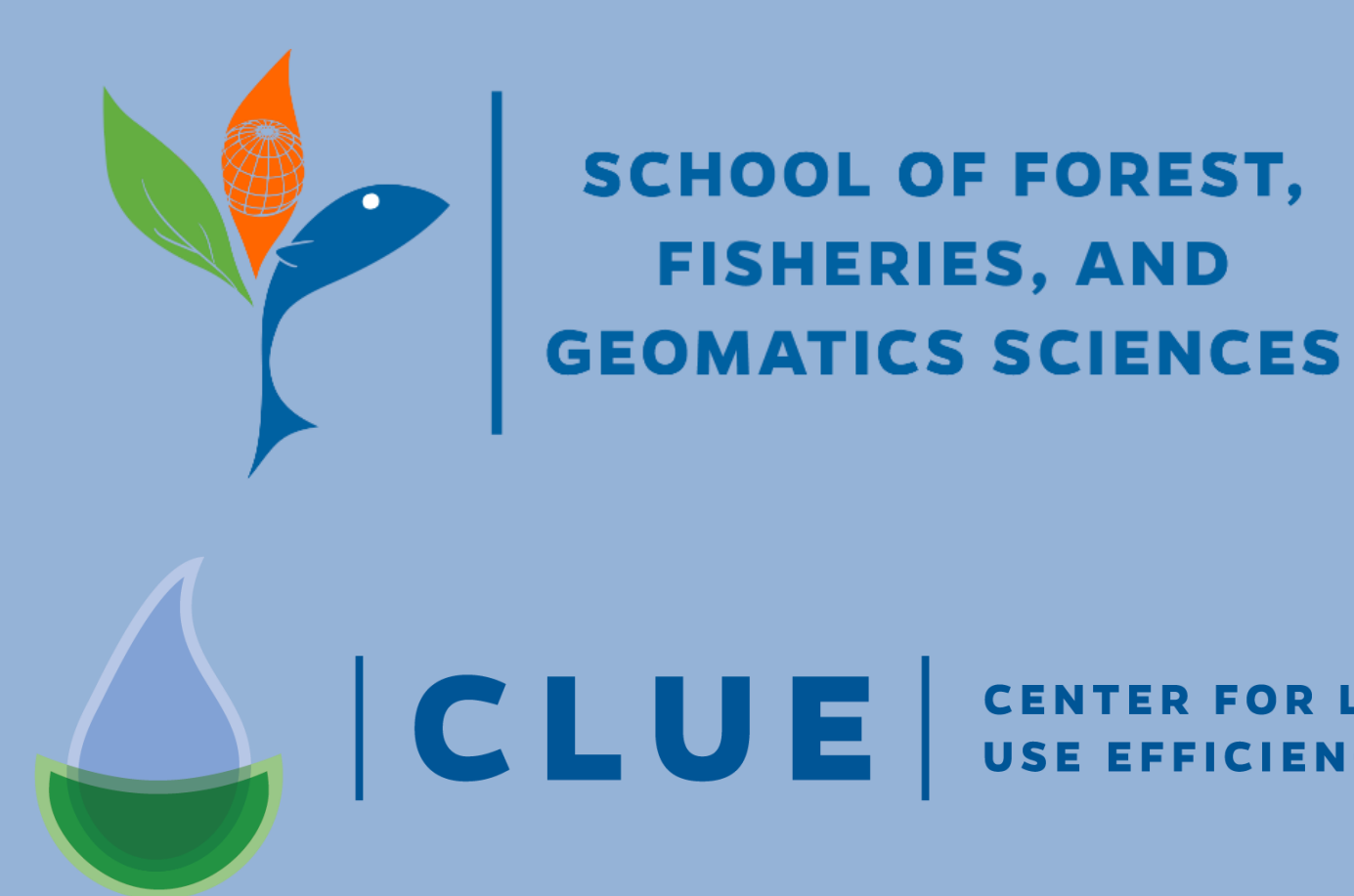


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Effects of Residential Landscaping on Alpha and Beta Plant Diversity Across Spatial Scales



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Background

- As residential landscapes expand, they are influenced by socio-ecological dynamics (Chowdhury et al. 2011)
- The plants people value in yards tend to be aesthetic **ornamental** species (Gobster et al. 2007) (Fig. 1)
- However, there are many self-recruiting plants in yards, especially at the **groundcover** level (Fig. 2)
- People are “blind” to many plants around them, especially less aesthetic plants (**plant blindness**) (Wandersee et al. 2001)
- Preference for ornamental species over self-recruiting species may affect patterns of biodiversity across spatial scales

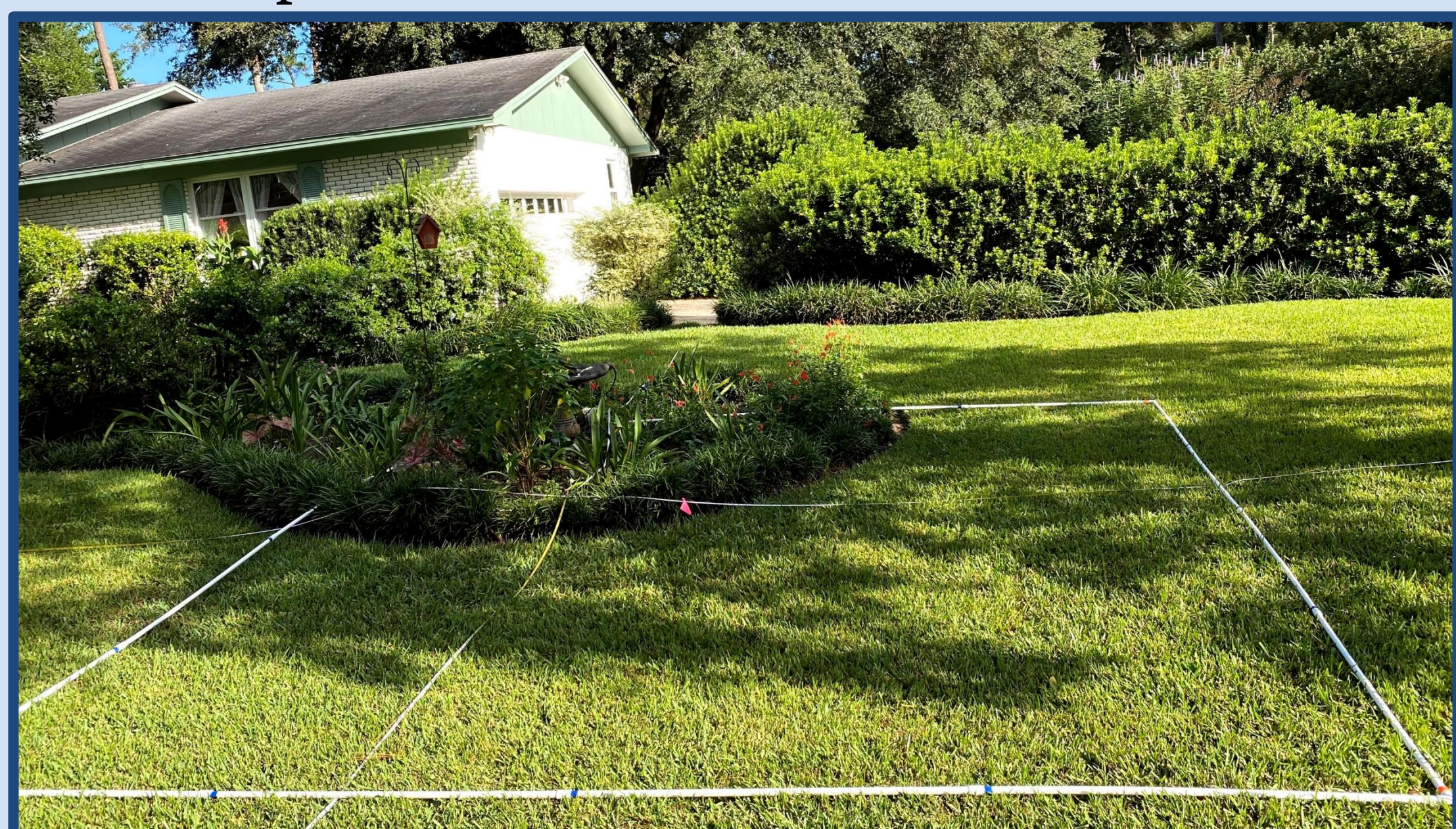


Fig. 1 A landscape with greater abundance of ornamental species and few self-recruiting groundcover species



Fig. 2 A landscape with many self-recruiting groundcover species

Hypotheses

Because ornamental plants vary at the yard level and self-recruiting plants are similar among yards...

H1: beta diversity of groundcover decreases while that of ornamentals increases with spatial scale

H2: alpha diversity of ornamentals increases more rapidly than of groundcover with spatial scale

H3: Homeowners underestimate species richness due to not acknowledging groundcover species

Methods

- Nested sampling design (Fig. 4): identified plant species at lawn and higher vertical strata in 238 plots in the front and back half of 30 residential yards in 4 neighborhoods in Gainesville, FL, United States
- Homeowners were surveyed to determine perceived species richness in front and back yard (Fig. 3)
- We calculate **alpha** (average species richness) and **beta** diversity (Simpson's dissimilarity) for ornamentals and groundcovers at increasing spatial scales (plot, half-yard, full yard, neighborhood)

Fig. 3 Lab members sampling a plot and recording species richness

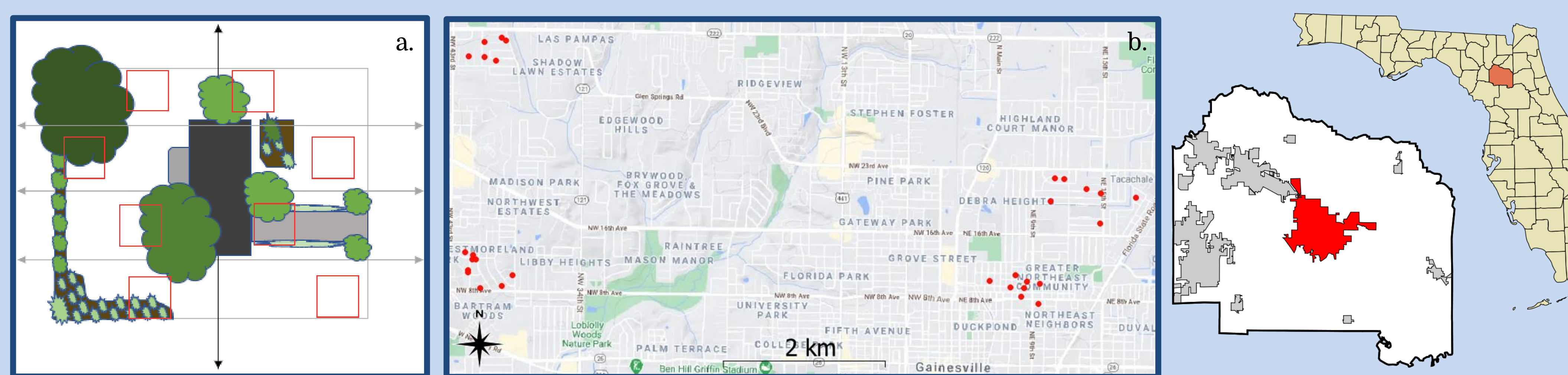


Fig. 4 Our nested sampling design includes four randomized plots in each front and back yard of 30 residences (a.) in four distinct neighborhoods (b.) in Gainesville, Alachua County, Florida (c.)

Results

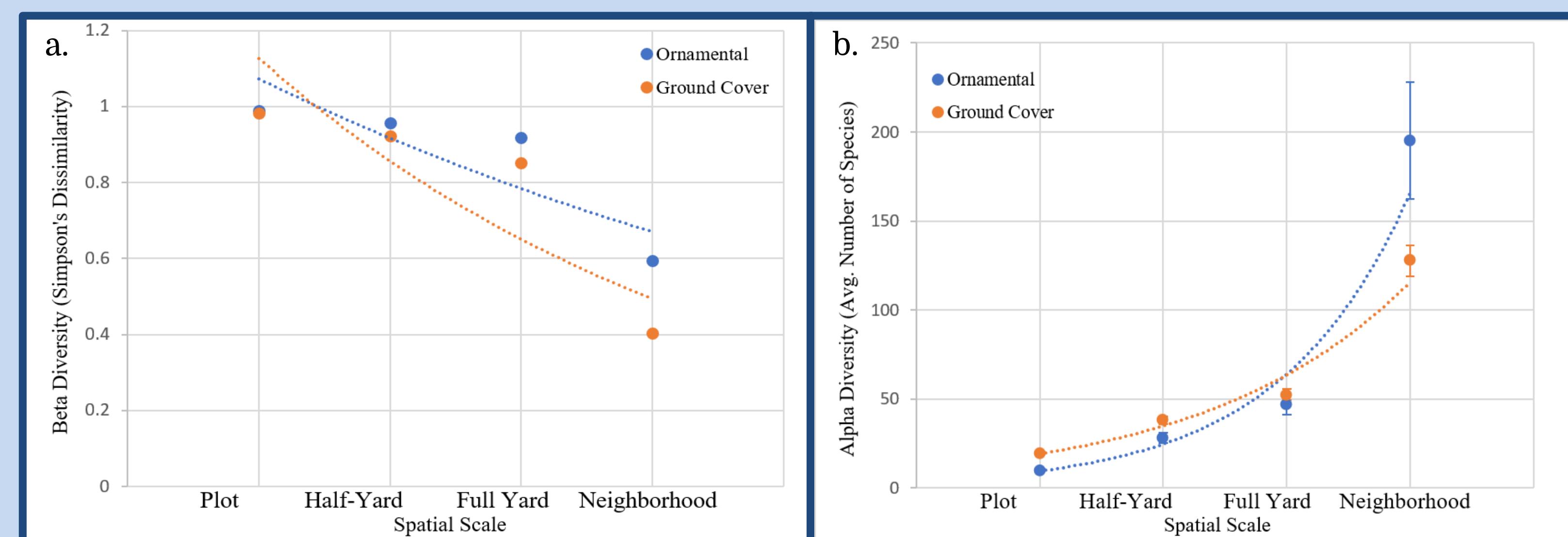


Fig. 5. Beta diversity of both groundcover and ornamentals decreases with spatial scale, however groundcover decreases more rapidly (a.). Alpha diversity of ornamentals is significantly greater than that of groundcover only at the neighborhood level; error bars show 95% CI (b.)

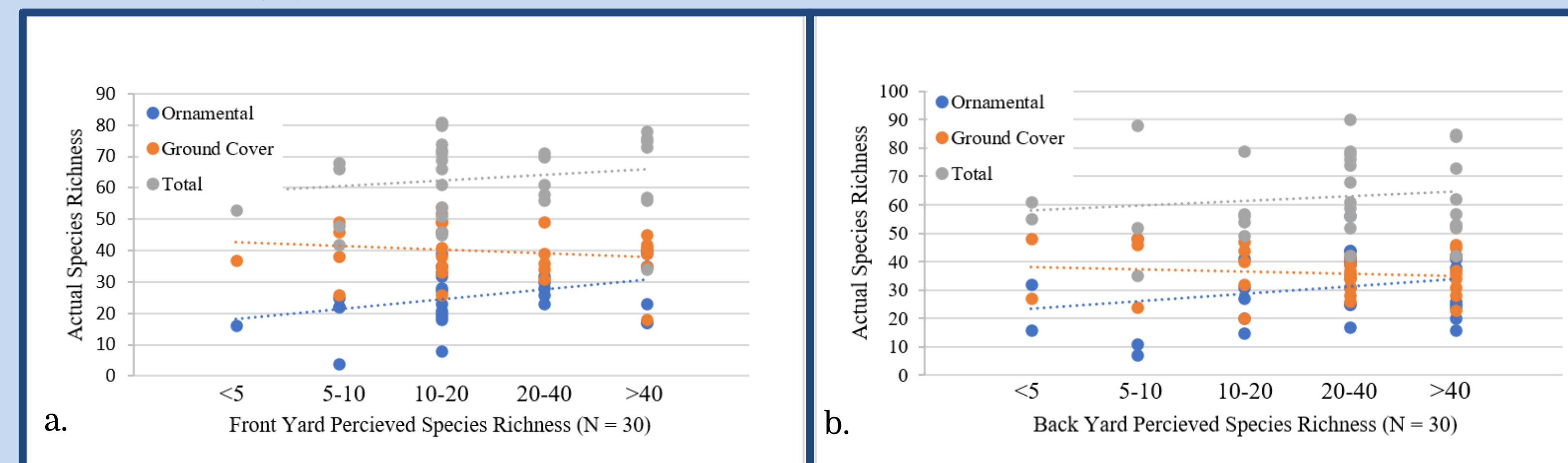


Fig. 6. Actual species richness is greater than perceived species richness in front and back yards. Weak correlation of perceived species richness and ornamental species richness in front yards (a.) $r_1 = .29, p = .04$

Conclusions

- Beta diversity of groundcovers and ornamentals decreases with spatial scale: groundcover is more dissimilar at higher scales than expected (Fig. 5a)
- Hypothesis 2 is supported: groundcover alpha diversity is greater than that of ornamentals at smaller spatial scales, but not at neighborhood level (Fig. 5b)
- Hypothesis 3 is supported: Plant blindness apparent in both groundcover and ornamental species (Fig. 6)
- Social perception affects patterns of plant diversity across spatial scales

Next Steps

- Seek appropriate statistical models
- Understand the implications of this overlooked biodiversity
- Research the affect of plant origin (native vs. non-native) on alpha and beta diversity with increasing spatial scale
- Research ornamentals vs. self-recruiting species in other layers of plant community
- Consider how to utilize these patterns to design more ecologically beneficial residential landscapes
- Develop educational/extension materials to bring awareness to plant blindness

Gamma Diversity
(Total number of species in the study area) = **650 species**

• 436 ornamentals

• 214 groundcover

• 155 additional species were recorded in yard census

• Total number of species detected: 805



Fig. 7 Future findings can influence ecological urban landscapes

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