*New Phytologist Cover Letter*

April 5th, 2024

Dear Editor,

Enclosed find our manuscript titled “Nuisance species compromise carbon sequestration potential in an Eastern US temperate deciduous forest”. Temperate deciduous forests are a crucial component of the global carbon cycle, yet the influence of nuisance species, or species that are introduced or amplified in an ecosystem as a result of human activity, are not fully captured in the projections of current global carbon models. Nuisance species, which include non-indigenous pests and pathogens and overabundant herbivores, have a profound effect on carbon cycle dynamics within temperate forests.

Our manuscript evaluates the changes in living aboveground biomass (hereby referred to as ABG) in a mature, secondary temperate deciduous forests in the mid-Atlantic region of the United States, with special attention paid to three distinct areas defined by deer-browsing pressure and the vulnerability of the canopy individuals to regionally established pests and pathogens. Using fifteen years of detailed forest census data, we demonstrate that for the first time since the site’s establishment, there was a substantial reduction in AGB, decreasing from 145.9 to 140.9 Mg C ha-1 over the past five years. The decline in ABG was observed in all areas of the plot but was most prominent in the area characterized by high deer-browsing pressure and high canopy vulnerability. The loss of living biomass was partially driven by mortality in canopy individuals that are susceptible to pests and pathogens, including *Fraxinus americana*, with a peak mortality flux of 5.3 Mg C yr-1. However, these increased rates of mortality were accompanied by a severe depletion of the canopy species in areas with high deer browsing pressure, creating a regeneration debt that will impede the forest’s capacity to regain a canopy of similar structure and composition in the future.

Our findings indicate that if current trends persist, the forest will continue to lose AGB and could be at risk of transitioning to a lower biomass ecosystem. This site could serve as a canary in the coal mine, signaling the carbon sequestration potential of the temperate forest biome as a whole is likely overestimated by global carbon models. Readers of the New Phytologist Anthromes Special Issue will be intrigued by the influence of human-induced changes on widely utilized projections of carbon dynamics, which will become increasingly relevant in the coming decades as these influences increase in frequency and severity.

Thank you for your consideration of our manuscript. If you have any questions, please do not hesitate to contact me.

Sincerely,

Luca L. Morreale