Dear Dr. Ellison:

We are submitting for your consideration our manuscript, “Changes in Forest Composition, Stem Density, and Biomass from the Settlement Era to Present in the Upper Midwestern United States.”

This paper presents a major new analysis and synthesis of settlement-era forest composition, stem density, basal area, and biomass, based on Public Land Survey (PLS) data from the Upper Midwestern United States. Our analysis substantially advances from prior PLS-based work by developing new methods for correcting for surveyor bias, particularly with respect to estimating stem density (and thus basal area and biomass) in a way that accounts for changing survey design throughout the region. This paper is also the first to provide PLS-based estimates of historical forest biomass at this broader regional scale.

We apply the new PLS-based dataset to contrast forest structure and composition prior to Euro-American settlement with modern forest structure from the Forest Inventory and Analysis database. Key findings include:

1. Contemporary forests in the upper Midwest have higher stem density and total basal area than settlement-era forests, but lower biomass, likely because of the larger size of individual settlement-era trees.
2. Almost 30% of the modern forested landscape of the upper Midwest is compositionally novel relative to the PLS data, while 25% of forests in the PLS era have no modern analogues.
3. The loss of PLS forests is concentrated in central Wisconsin, near the Tension Zone, and is associated with a weakening of ecotones and an overall homogenization of forest cover across the region.

We anticipate that these PLS-based datasets will become the new standard for settlement-era forest composition and structure, and we are working closely with terrestrial ecosystem modellers to use this as a baseline dataset for a series of historical-to-21st-century experiments and modeling intercomparison protocols.

Thank you for your time and consideration.

Sincerely,

Simon Goring