To the Editors

The attached manuscript, “Changes in Forest Composition, Stem Density, and Biomass from the Settlement Era to Present in the Upper Midwestern United States” provides a broad-scale synthesis of Public Land Survey (PLS) data from the Upper Midwestern United States, contrasting forest structure and composition prior to Euro-American settlement with modern forest structure from the Forest Inventory and Analysis database.

This paper builds on prior work at the state level, in this journal and others, for each of Wisconsin and Minnesota, but extends analysis across three states, from Minnesota to Michigan, across two major ecotones, from prairie to forest (in both Minnesota and Wisconsin) and from southern deciduous forests to northern confer dominated forests. Our analysis provides methodological advances in estimating stem density (and thus basal area and biomass) from PLS data, accounting for changing survey design throughout the region, and also provides the first estimate of biomass at this broader regional scale.

We have made an effort to highlight the ecological changes in the region while also focusing on the methodological underpinnings that allow us to go from 19th century survey records to reliable estimates of forest structure and composition. This has resulted in a monograph that is able to fully account for sources of uncertainty in the PLSS, and provide statistically meaningful comparisons to modern structure from the FIA.

Key findings are the fact that 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. This loss of forest types from the PLS era to the modern FIA survey data is also associated with a bluring of ecotones, and an overall homogenization of forest cover across the region. These findings are significant, as they indicate a degree of change in forests that has not yet been fully explored. They also provide the basis for a number of studies arising as part of the PalEON Project, including studies into the contrasting (and complimentary) roles of land use change and climate change since EuroAmerican settlement in shifting species climate niches in the region (Goring et al., in prep), to examining shifts in pollen-vegetation relationships (Kujawa et al.), to improve models of land-climate feedbacks in dynamic vegetation models (Matthes et al in prep) and to provide a better understanding of the ecological meaning of old growth forest from a historical perspective (McLachlan et al, in prep).

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