

Oral Presentation

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Nitrogen dynamics in northern peatland ecosystems

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Nitrogen pollution has become a global issue over the last century due to increased fertilizer use and burning of fossil fuels. Excess N has been responsible for algal blooms, hypoxic zones, climate change, and human health issues. Extent of peatlands in the Great Lakes basin is thought to provide an important ecosystem service by removing a significant amount of N from the basin. However, northern peatlands are particularly sensitive to N additions, due to their unique hydrological and biogeochemical properties. As a consequence, increased N loading to these systems may result in increased greenhouse gas emissions. We examined nitrification/denitrification in two types of peatlands in the USFS Marcell Experimental Forest: minerotrophic fens and ombrotrophic bogs. In general, the bog had higher nitrification and denitrification rates ($3.36 \text{ ugN g}^{-1} \text{ d}^{-1}$ and $1148.88 \text{ ugN g}^{-1} \text{ d}^{-1}$) than the fen ($1.44 \text{ ugN g}^{-1} \text{ d}^{-1}$ and $406.08 \text{ ug g}^{-1} \text{ d}^{-1}$), respectively. Within each peatland type we examined three depth layers of the upland, lagg or transitional, and hummock and hollows in the bog or fen zones. Upland zones were least active except for denitrification in the hummock/hollow bog zones. An addition of nutrients (N, C, or N+C) demonstrated all sites/zones/depths to be nitrogen limited and sometimes carbon limited. From this research we gain an understanding how these two peatland types and their respective zones function and how they contribute to the overall watershed N budget.