DENITRIFICATION RATES IN A LAKE SUPERIOR COASTAL WETLAND

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Inputs of anthropogenic nitrogen to the Nation's aquatic ecosystems have increased substantially over the past several decades. Nitrogen inputs to Lake Superior since about 1900 have increased at a rate of about 2 percent per year, doubling about every 35 years (Bennett, 1986), although recent data indicates that the rate of nitrate increase may be leveling off (Sterner et al. 2007). The amount of excess fixed nitrogen removed from the freshwater aquatic nitrogen cycle by denitrification is largely unknown. Typically, denitrification rates increase within sediments that have higher organic content; in this context we measured dentirification in organic-rich sediments of Lost Creek Wetland on the South Shore of Lake Superior. The concentrations and sediment-water exchange rates of dinitrogen gas, nitrate, and ammonia were determined. A ratio of N_2 release/NO_3 uptake in NO_3 enriched cores was established where the N_2 rate was measurable. The ratios between NO_3 uptake and NO_3 concentration allowed us to calculate the N_2 flux rate at various environmental concentrations in different areas of the wetland such as those receiving NO_3 rich lake water and backwaters not receiving this enrichment. Calculated N_2 flux rates in August using overlying ambient wetland water and Lake Superior water were 0.30 (n=2) and 8.6 (n=2) umol/m-2/hr-1, respectively. These rate measurements quantify a missing piece of wetland and lake nitrogen transformations and budgets.

Preference: Oral presentation