Title: Is phosphorous limitation altering food web processes in AMD remediated streams?

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Acid mine drainage (AMD) is a legacy of Ohio's pre-regulation coal mining. AMD decreases stream pH, increases metal load, and decreases aquatic species richness and abundance. Remediation efforts have been successful in ameliorating water quality with elevated pH and decreased dissolved metals. At many AMD-remediated sites, there has been biological recovery as measured by multimetric diatom and macroinvertebrate indices that emphasize taxonomic diversity, but success has not been universal. Restoring ecosystem function is an important component of successful restoration plans as it increases the stability and resilience of the system to pulses of pollution. The goals of this study were twofold: 1) determine the utility of biofilm lipid profiles as a means to identify compositional changes related to environmental differences and 2) measure stream functional responses to remediation efforts. We compared biofilm community structure (PLFA profiles, lipid biomass, and chlorophyll a) and function (productivity, and extracellular enzyme activity) from three stream categories (AMD-unimpaired, AMD-impaired, and AMD-remediated, N=5 each) in southeastern Ohio. Biofilm communities associated with each stream category were distinct in both structural and functional measurements. AMD-impaired sites had the lowest chlorophyll a and lipid biomass and AMD-unimpaired streams the highest. AMD-remediated sites were intermediate between AMD-unimpaired and AMD-impaired in all measurements of structure including PLFA profiles and AFDM. Measurements of biofilm production were significantly lower in the AMD-impaired and AMD-remediated sites compared to the AMD-unimpaired sites. Secondary production mirrored primary production with invertebrates being more reliant on the detrital energy pathway than photosynthetic. AMD-impaired and AMD-remediated communities had significantly higher ratios of phosphorus:nitrogen acquiring extracellular enzymes, suggesting potential phosphorus limitation of the biofilm community which may have cascading effects on the rest of the food web.