

## **Exploring diel community and functional dynamics of freshwater wetlands**

HORTON, D.J.<sup>1</sup>, LEARMAN, D.R.<sup>1\*</sup>, COOPER, M.J.<sup>2</sup>,  
WING, A.J.<sup>1</sup>, KOURTEV, P.S.,<sup>1</sup> UZARSKI, D.G.,<sup>1</sup>

<sup>1</sup>Department of Biology and Institute for Great Lakes  
Research, Central Michigan University, Mount Pleasant,  
MI, 48859 U.S.A. (\*correspondance:  
deric.learman@cmich.edu)

<sup>2</sup>Burke Center for Freshwater Innovation, Northland College,  
Ashland, WI 54806 U.S.A.

Temperature, O<sub>2</sub>, and pH often fluctuate over diel timescales within wetlands, driven by sunlight, photosynthesis, and respiration. These daily cycles have been shown to impact biogeochemical cycles (e.g. denitrification), which are mediated by the residing microbial community. However, little is known about how resident microbial communities respond to daily dramatic geochemical fluxes in these ecosystems. This study illustrates that geochemically distinct freshwater wetlands host taxonomically unique microbial communities and these communities respond differentially to geochemical shifts associated with diel cycles. However, in the wetlands sampled, community structure (beta diversity) was not significantly related to diel variation, which suggests that diel shifts do not impact the dominant fraction of active microbial taxa, and may instead, influence only rare taxa. Corroborating this, subcommunities within each wetland were found to correspond to fluctuating environmental variables, such as O<sub>2</sub>, pH, temperature, or a combination of environmental factors. Subnetworks of microbial taxa that were found to be susceptible to fluctuating O<sub>2</sub> levels could have intimate ties to diel redox cycles. Metatranscriptomic data are currently being analysed to examine the functional relationship between diel cycles and redox cycles. This study highlights that wetland diel cycles and associated microbial community responses are widely variable and related to local geochemistry.