Qiagen Young Scientist Research Grant ($10,000 total)

-$5,000 worth of Qiagen product

-$5,000 worth of CLC Workbench Premium license

Describe the challenges your study addresses, why it matters, and how your approach stands out. Think of it as your elevator pitch – what makes your research important and impactful. (75 words max)

Microbes play essential roles in biogeochemical cycles and ecological processes within freshwater ecosystems. However, much of what is known of such contributions has been derived from open water seasonal sampling only. Specifically, overwintering activities of microbes may have cascading effects into subsequent seasons, but synoptic scale studies remain absent. Here, we collected water samples from across the Laurentian Great Lakes basin in 2024 and 2025 to evaluate how microbial community composition varies seasonally and annually.

Describe your proposed research. Include the background, methods, and aim(s). (300 words max)

In comparison to summer and spring, winter remains an understudied period in freshwater systems, resulting in a knowledge gap regarding year-round lake patterns. Recent research suggests that under-ice dynamics influence the biogeochemical and ecological processes of subsequent seasons, making winter a crucial component of annual lake patterns. This is especially true for microbial and planktonic communities, where delayed ice-on has been shown to affect community composition and alter spring trophic interactions. Further, differences in winter conditions have an underlying potential for trophic cascades and a resulting prevalence bottom-up controls for grazer populations and their food sources. Our research seeks to further our understanding of winter on microbial community composition in the Laurentian Great Lakes. By providing a succinct body of data collected within a narrow temporal window of 2-3 weeks, we aim to be the first to create a comprehensive winter dataset of this size and breadth across the Great Lakes. We collected surface water samples from across the Laurentian Great Lakes basin during the winter, spring, and summer of 2024 and the winter of 2025 to account for interannual differences in winter severity and to capture the potential cascading effects of winter on microbial community composition in subsequent seasons. Community assemblages will be extracted, verified via PCR, and characterized via 16S rRNA sequencing. Chemical analytes, winter water quality, and ice cover records will supplement the microbial community dataset. We hypothesize that microbial community composition will vary between winters because of differences in winter severity. Further, we predict that microbial communities in spring and summer will be directly influenced by winter conditions and communities. We intend to compile this data to inform future targeted research and best management practices in the pursuit of maintaining the Great Lakes ecosystem.