Seasonal variation in microbial community dynamics and organic matter in the Great Lakes

Author(s): Connor O’Loughlin1, Gord Paterson1, Nicole Wagner2, Hunter Carrick3, Jonathan Doubek4, Donald Uzarski3, Trista J. Vick-Majors1, with the Winter Grab Network

1Michigan Technological University, 2Oakland University, 3Central Michigan University, 4Lake Superior State University

Abstract (230 words or less)

Winter has been regarded as a period of relative dormancy in limnetic systems, characterized by diminished biological activity. The Great Lakes Winter Grab and other recent work have provided evidence that microbial communities remain active during winter, and important biogeochemical processes still occur. Here, we present work aimed at understanding the microbial ecology of the Great lakes during winter. We hypothesized that microbial activity across lakes and seasons would vary, and that activity would be modulated by primary production, organic matter, and nutrient availability. Through the Great Lakes Winter Grab network, we took water samples from each of the Great Lakes and Lake St. Clair. The samples were used to measure bacterial production via incubations with tritiated leucine and thymidine and characterize community assemblages via 16S rRNA gene sequencing, and to measure inorganic nitrogen and phosphorus concentrations. Dissolved organic matter in the water samples was characterized via fluorescence excitation-emission matrix spectroscopy. We found that the activity of microbial communities shifted to focus on respiration during the winter. Together, our data provide insights into the responses of microbial communities and organic matter biogeochemistry to seasonal change in the Great Lakes.