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Title (300-character limit):

Seasonal Shifts in Microbial Community Composition and Zooplankton Trophic Ecology of The Laurentian Great Lakes

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Abstract (2,000-character limit):

It has been established that winter variables such as ice cover, ice duration, water temperature, and snow fall have a profound bearing on winter ecology and biogeochemistry. Winter variables, and the associated communities establish biological conditions for the following shoulder seasons, and subsequent community assemblages. However, due to traditional limnological views, and logistical difficulties in sampling, there remain crucial gaps in understanding how winter conditions impact various communities. Therefore, it is important to unravel the various ways in which communities adapt to winter conditions, and how those communities change as they come into spring, and summer. We hypothesize that bacterial communities will adapt to winter conditions by exhibiting reduced levels of production in the winter relative to spring and summer, and by shifting to communities with lower overall abundance and biodiversity. Additionally, zooplankton trophic ecology will show a shift from bacterial biomass as a carbon source in winter, to microzooplankton in the spring. To investigate this, water samples were collected from each of The Great Lakes and Lake St. Clair. Zooplankton trophic ecology was measured using carbon (d13C) and nitrogen (d15N) stable isotopes. Bacterial production was measured via incubations with tritiated (3H) leucine, and thymidine, while bacterial community composition was characterized via 16S rRNA gene sequencing. We found that bacterial production was reduced in winter in comparison to spring and summer, and that winter microbial community composition was lower in overall abundance. Zooplankton trophic ecology highlights a derivation of carbon sources from winter to spring, as well as and overall change in trophic status of zooplankton. Our findings aim to augment our understanding of winter ecology and its impact on subsequent seasons.