EXAMINING THE IMPACTS OF GLACIER-DERIVED NUTRIENT SOURCES ON MARINE PHYTOPLANKTON IN THE CANADIAN HIGH ARCTIC

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Meltwater from tidewater glaciers, glaciers which terminate in the ocean, can augment nutrient concentrations in surrounding ocean surface waters. There are two proposed mechanisms by which this marine nutrient enrichment can occur: (1) direct addition of glacier-derived nutrients from meltwater inflow; (2) vertical entrainment of nutrient rich deep-water by buoyant subglacial inflow. Glacial meltwater can contain elevated concentrations of micronutrients such as iron and manganese while entrained deep-water has greater concentrations of macronutrients like nitrate and silicate. Despite evidence of enhanced summer phytoplankton blooms near tidewater glaciers, exactly how the nutrients provided by each meltwater mechanism stimulate phytoplankton community growth in different regions is unclear. Current work examining glacier-ocean interactions has largely been focused on Greenland and Antarctica, with little focus on the Canadian Arctic Archipelago (CAA). Incubation experiments performed in Ausuittuq (Grise Fiord), Nunavut during the summer of 2021 aimed to uncover how each meltwater mechanism impacts summer phytoplankton. Phytoplankton from Jones Sound were inoculated with glacial meltwater and/or deep seawater, representing direct addition of glacial meltwater and entrained nutrient rich deep-water. Nutrient concentrations, phytoplankton community composition and growth were monitored throughout the experiments. Water column samples were also taken from Jones Sound and glacial meltwater streams to provide an in-situ context for experimental results. Collectively, our results will yield novel insight into how each meltwater

mechanism may influence summer phytoplankton activity. Tidewater glaciers are rapidly retreating across the CAA, with as yet under-studied consequences for surrounding marine ecosystems if phytoplankton communities are reliant on glacier-derived nutrients. Characterising these consequences is an important step in understanding our warming world.

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