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Assessing Resiliency in a Large Lake Receiving Mine Tailings Waste: Impacts of Major Environmental Disturbance.

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On 4th August 2014, the tailings impoundment of the Mount Polley copper and gold mine in British Columbia failed. Material from the impoundment (surface area = 2.7 km2) flowed into nearby Polley Lake and Hazeltine Creek, before discharging into Quesnel Lake, a large (ca. 100 km long, >500 m deep), relatively pristine lake. Initial estimates suggest that approximately 25 Mm3 of tailings (water and solids) and eroded soils and surficial materials from Hazeltine Creek were delivered to Quesnel Lake, raising the lake by 7.7 cm. Much of this material was deposited at the bottom of Quesnel Lake but a plume of fine-grained sediment (D50 of ca. 1 μm) remained suspended in the water column. The impact of the distribution of this sediment was monitored over the next 15 months using water column profiling for temperature, conductivity, fluorescence and turbidity with depth. The plume movement was regulated by natural processes associated with the physical limnology of this large fjord lake, specifically, seiche events which transferred suspended particles both up-lake, against the flow regime, and down-lake into the Quesnel River. Samples of lake water and bottom sediment taken from the impacted area show elevated levels of total metals and other elements, which may have important ecosystem implications in this watershed. Indeed, the breach occurred at a time when a peak run of sockeye salmon were returning to their natal streams in the Quesnel basin. Zooplankton sampling for metals was initiated in fall 2014 to determine up take of metals into the food web. This poster describes the failure of the impoundment dam and presents results of sampling the aquatic environment over the first fifteen months of impact.