Coal Lake Outlet Freeze-up, Containment of Winter Inflows and Estimates of Related Outburst Flood

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Abstract

Coal Lake is a one square kilometre lake located along the main stem of the Wolf Creek research watershed near Whitehorse, Yukon, Canada. During the unusually cold January of 1996 the lake outlet froze completely blocking the outflow and creating a storage situation in Coal Lake for the balance of the winter period. This had not been observed before. Above freezing temperatures in the spring allowed the stored water to breach the ice dam and create an outburst flood in excess of the 1996 freshet flows. This flood occurred more than a month before the snowmelt peak. A hydrometric station at the outlet of Coal Lake was not instrumented for the open water season until the receding limb of this event. As a result, no record of this flood could be documented for the annual hydrograph. A water balance analysis was used to simulate this flood. Inputs were; winter recession flows from a hydrometric station upstream of the lake, lake water levels, personal observation, the receding limb of hydrographs (recorded at the Coal Lake outlet hydrometric station and a downstream hydrometric station). The output from this analysis is the estimated daily mean discharge for the period of the outburst flood. This allows a significant portion of the annual hydrograph to be quantified.