



BACKGROUNDER

Hydrological Analysis of Great Slave Lake

Why was a hydrological analysis done for Great Slave Lake?

In 2020, Great Slave Lake had the highest water levels since levels were first recorded in 1939. Due to these conditions, the Government of the Northwest Territories requested that an interjurisdictional technical working group of experts be created. Its purpose was to better understand and explain the high water levels on Great Slave Lake in the summer and fall of 2020, and if there was potential for this high water to continue in 2021.

When was the working group formed and who was involved?

Environment and Climate Change Canada formed the working group in September 2020. The group included a team of hydrological experts from Environment and Climate Change Canada, the Government of the Northwest Territories and the Global Water Futures program from the University of Saskatchewan, as well as representatives of the Government of Alberta and BC Hydro. The working group has completed a report of its analysis – *Hydrological Analysis for Great Slave Lake 2020*.

What did the working group determine is causing the high waters levels on Great Slave Lake?

Great Slave Lake, located in the Northwest Territories, is a part of the very complex Mackenzie River Basin. The lake is impacted by water inflows from several large upstream river systems, located in British Columbia, Alberta and Saskatchewan.

The analysis confirmed heavy precipitation in nearly all basins that feed into Great Slave Lake caused the high water levels. Inflows of water were consistently higher than outflows for most of 2020, particularly in July. Provisional hydrometric observations found all major tributaries to Great Slave Lake reached higher than normal levels – including the Peace, Athabasca and Slave rivers, as well as Lake Athabasca and the Peace-Athabasca Delta. The analysis also showed very high inflows to Great Slave Lake from local surrounding rivers, especially to the east and southeast of the lake such as the Taltson, Lockhart, Kakisa and Hay rivers.

Did the W.A.C Bennett Dam have any impact on Great Slave Lake water levels this past summer and fall?

The analysis looked at the operation of the Williston Reservoir and the W.A.C. Bennett Dam on the Peace River in British Columbia, which makes up the majority of flow in Slave River. Since the construction and filling of the Williston Reservoir in 1972, annual water levels on



Great Slave Lake generally fluctuate less than previously, with lower peak flows and higher low flows. Preliminary modeling suggests water levels on Great Slave Lake may have been higher had the dam not contained high inflows to its reservoir during the spring and summer.

When will high water levels on Great Slave Lake begin to fall?

That is difficult to predict. The recent and current conditions are unprecedented and what happens over the next few months will depend on several variables – the timing and volume of precipitation, the timing and rate of snow and ice melt in the spring and the thickness of river and lake ice. Even if inflows decrease significantly, it will take a long time to reduce water levels on Great Slave Lake because it has such a large storage capacity (it is the deepest lake in Canada and the 10th largest lake in the world). The report states that the working group does not anticipate Great Slave Lake water levels to return to normal historical levels for an extended period of time based on statistical modelling analysis.