



Shuswap River Project Water Use Plan

Sugar Lake Reservoir Inflow Monitoring

Final Report

Reference: SHUMON-1

Report on Improved Hydrometric Monitoring

Study Period: 2006 to 2015

BC Hydro

August 31, 2016

Report on Improved Hydrometric Monitoring

(Part of 10-Year Review of Shuswap River Water Use Plan)

Background

Provision #5 of the Section 88 Order for the Shuswap River power development, issued by the Comptroller of Water Rights, dated 12 October 2005, requires that:

“The licensee shall maintain and operate to WSC standards a hydrometric station to improve flood forecasting ability.”

The above provision follows directly from a monitoring recommendation contained in the Shuswap River Water Use Plan, dated 18 August 2005, to improve inflow forecasting for Sugar Lake Reservoir as follows:

“There is uncertainty regarding the accuracy of inflow data used in operations planning for Sugar Lake Reservoir. Increasing the capability of an existing gauging station located on Eagle River will improve the inflow forecasting and play a key role in managing water at the Shuswap Falls and Sugar Lake facilities in the future. This monitoring study will involve improving the capabilities of the gauging station capacity in year one and then providing ongoing data collection and analysis through to Year 10 of the Water Use Plan.”

In accordance with the above, BC Hydro has been funding the operation of the hydrometric gauging station, Eagle River Near Malakwa (08LE024), by the Water Survey of Canada since 2005. Data from this gauging station has been used by BC Hydro as an index stream to support inflow forecasting and inflow data quality control for Sugar Lake Reservoir.

Purpose of Report

The purpose of this report is to review the effectiveness of the stream gauge monitoring at Eagle River in improving inflow forecasting for Sugar Lake Reservoir and to provide recommendations for ongoing monitoring as part of the 10-year review of the Shuswap River Water Use Plan.

Gauging Station Eagle River Near Malakwa (08LE024)

The Eagle River Near Malakwa station is located 67 km north-northwest of Sugar Lake Dam. The gauge has an unregulated catchment area of 932 km², only slightly less than the 1113 km² catchment area for Sugar Lake Dam.

The station has been in continuous operation since 1955 and has since undergone two notable upgrades as follows:

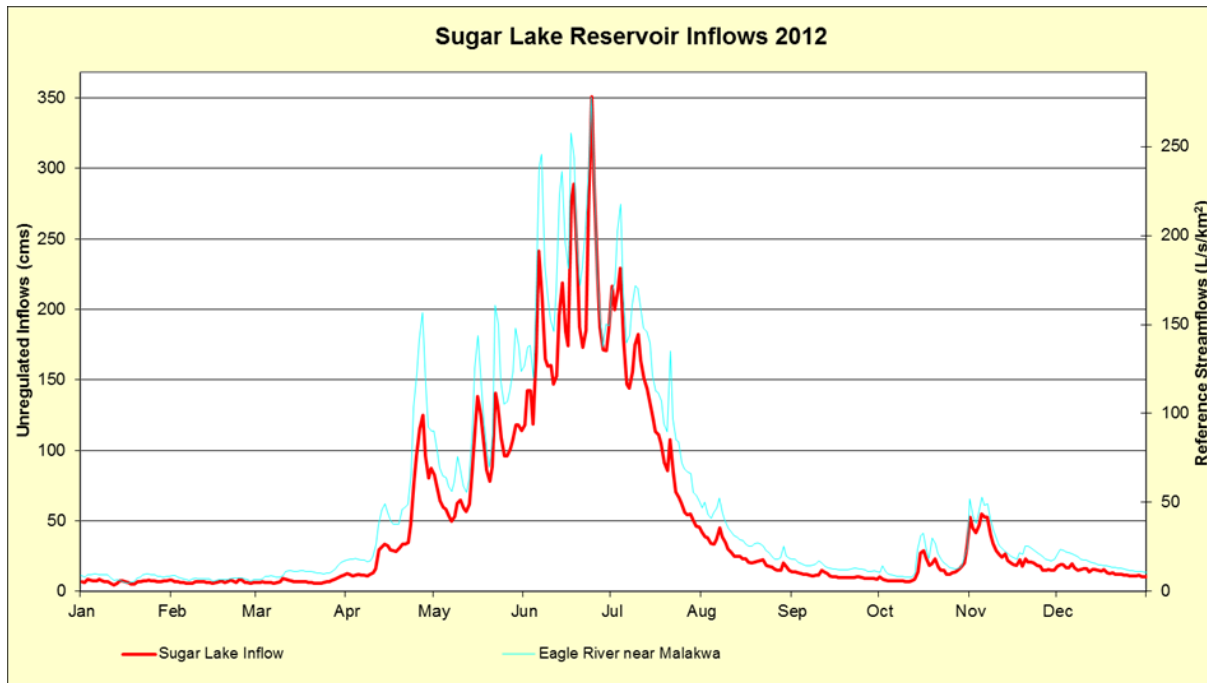
- 1999 - Station modernized from chart to digital logger/pressure sensor
- 2004 – New digital logger Installed

Real-time flow and level data can be retrieved from the station via telephone.

Inflow Forecasting for Sugar Lake Reservoir

Prior to 2005, inflow into Sugar Lake Reservoir had been calculated based on the changes in reservoir storage (based on changes in reservoir water levels) and reservoir discharge (based on stage/discharge rating tables for outlet facilities at Sugar Lake Dam). This method of inflow determination results in significant fluctuations and uncertainty particularly over short time periods such as on an hourly basis. In 2005, BC Hydro revised the inflow calculation procedure for Sugar Lake Reservoir to reduce uncertainty by replacing the discharge calculated from facility rating tables with actual streamflow data as recorded at the Shuswap River at Outlet of Sugar Lake Reservoir gauge (08LC018). Nevertheless, calculated reservoir inflow fluctuations persist due to the influence of wind and other environmental factors that can induce short-term changes in reservoir levels.

Supplementary data from streamflow gauges provide an important tool to runoff forecasters for predicting trends in hourly real-time inflows and for quality control of historical inflow data. Ideally, a streamflow gauge that correlates well with reservoir inflow data is used for these applications. The Eagle River Near Malakwa gauge correlates extremely well with Sugar Lake Reservoir inflows throughout the year (r-value of 0.99). An example below for 2012 shows how well the two trends match. No other gauge is considered to provide an adequate level of correlation for Sugar Lake Reservoir.



Recommendation

Data from the gauging station Eagle River Near Malakwa have been shown to be very valuable in supporting inflow forecasting and historical inflow data quality control for Sugar Lake Reservoir. Continued funding for the gauge through the WUP Program would ensure the gauge continues to operate and would not be subject to termination due to periodic Water Survey of Canada internal pressures for funding.