

Feb 02, 2021

Taltson Hydro – 2020 Water Flow

Purpose

This backgrounder provides overview information on the Taltson Hydro facility, focusing particularly on water flows and water management on the Taltson river system. This has received increased attention in 2020 with the record high water levels experienced in the Taltson and other river basins in the NWT.

Taltson Hydro Facility

Construction

Twin Gorges Generating Station (Taltson hydro plant) was constructed during the period 1963 – 1965. It is located on the Taltson River some 36 km northeast of Fort Smith. The Nonacho Lake storage dam is located approximately 210 km upstream from Twin Gorges (215 km northeast of Fort Smith). (NWT Power Corp, 2016)

The Taltson Hydro plant has an electrical capacity of 18 MW. At the full output of 18 MW the turbine uses approximately 67 m³/s of water (NWT Power Corp, 2016). The Taltson Hydro plant is the only hydroelectric facility on the river and there are no industrial facilities on the river.



Taltson Hydro Plant (NWT Power Corp, 2016)

South Valley Spillway

Any water in the Taltson River not passing through the plant for power production flows over a 200 m long concrete spillway constructed in a natural spill section called "South Valley", 10 km northeast of the plant. The spill water re-enters the Taltson River 1.8 km below the Twin Gorges plant via a 30 km long reach of Trudel Creek (NWT Power Corp, 2016).



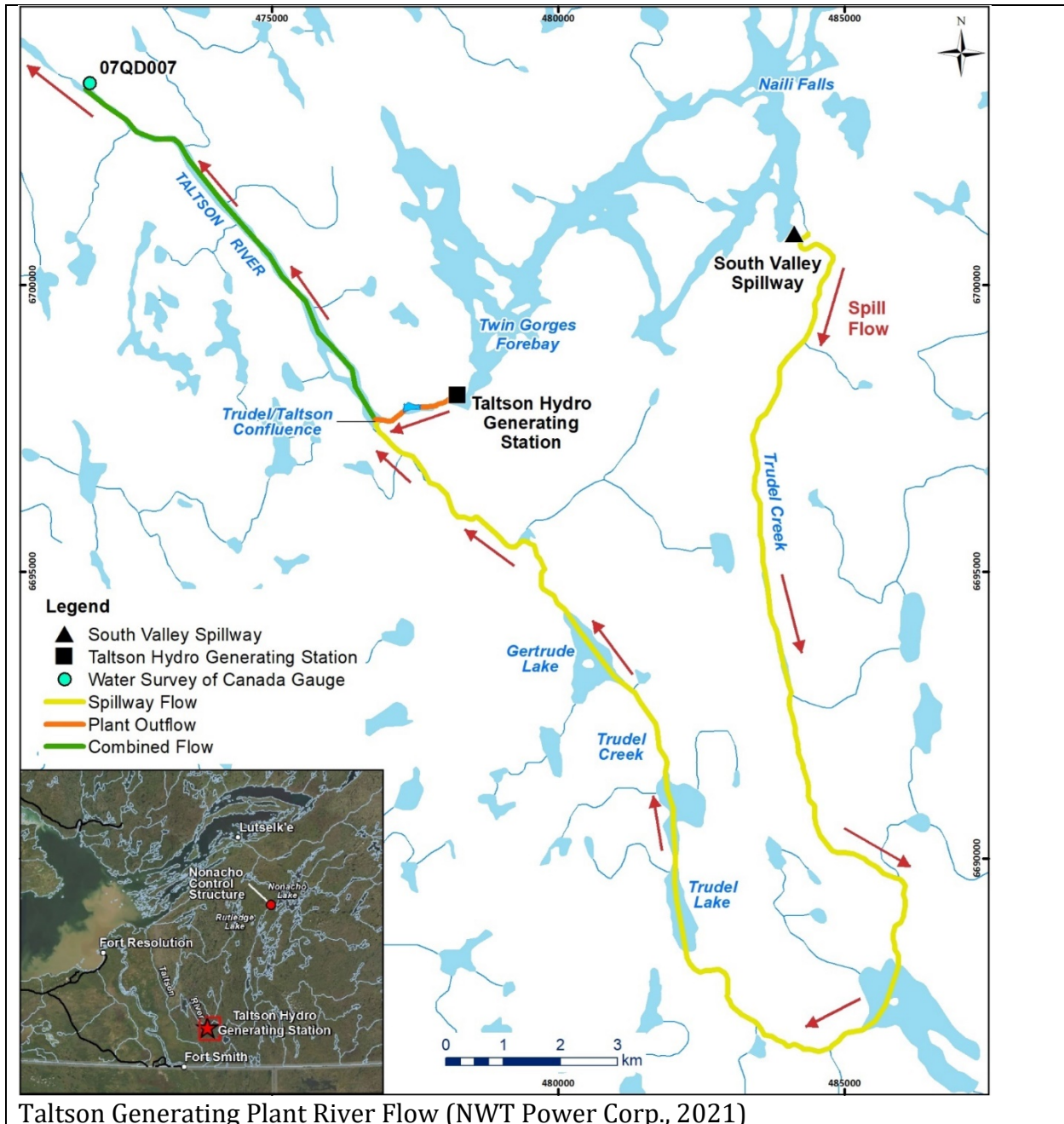
Taltson Main (South Valley) Spillway

Nonacho Lake Storage Dam

Early in 1968, a rockfill dam was constructed at the outlet of Nonacho Lake to create upstream storage to supplement natural winter flows and support a 4 MW expansion of the Twin Gorges generating station in response to increased power demands on the system while the Pine Point Mine was in operation. The dam contains three manually-controlled gates which can be opened to supplement flow to Twin Gorges during periods of reduced inflow. A natural rock escarpment adjacent to the dam was widened to 67 m to form an overflow spill (NWT Power Corp, 2016). Water from Nonacho Lake is not required to support the operation of the Twin Gorges generating station at current system loads.

Drainage Area

The Taltson River is about 650 km long and flows in an irregular pattern in its upper reaches and then northward in its lower reaches finally emptying into Great Slave Lake about 55 km east of Fort Resolution. It has a drainage area of about 65,000 km² (NWT Power Corp, 2016)



Since the closure of the Pine Point mine the system loads are much reduced and the natural low flows suffice to meet the energy demands of the system. Until such time as the system load grows through the addition of mining customers, this situation is not expected to change. Accordingly, under current circumstances, Nonacho Lake Reservoir is not operated to meet power demands.

Due to the low power demand on the system the Nonacho Spillway has been overflowing for many years, similar to the Twin Gorges Spillway, (NWT Power Corp., 2020, p. 9). The Nonacho gates were closed in 2014 and have not been opened since. NTPC anticipates it will need to open at least one gate in the spring of 2021 in order to keep the maximum lake level to within water license requirements.

Tazin Lake Contribution

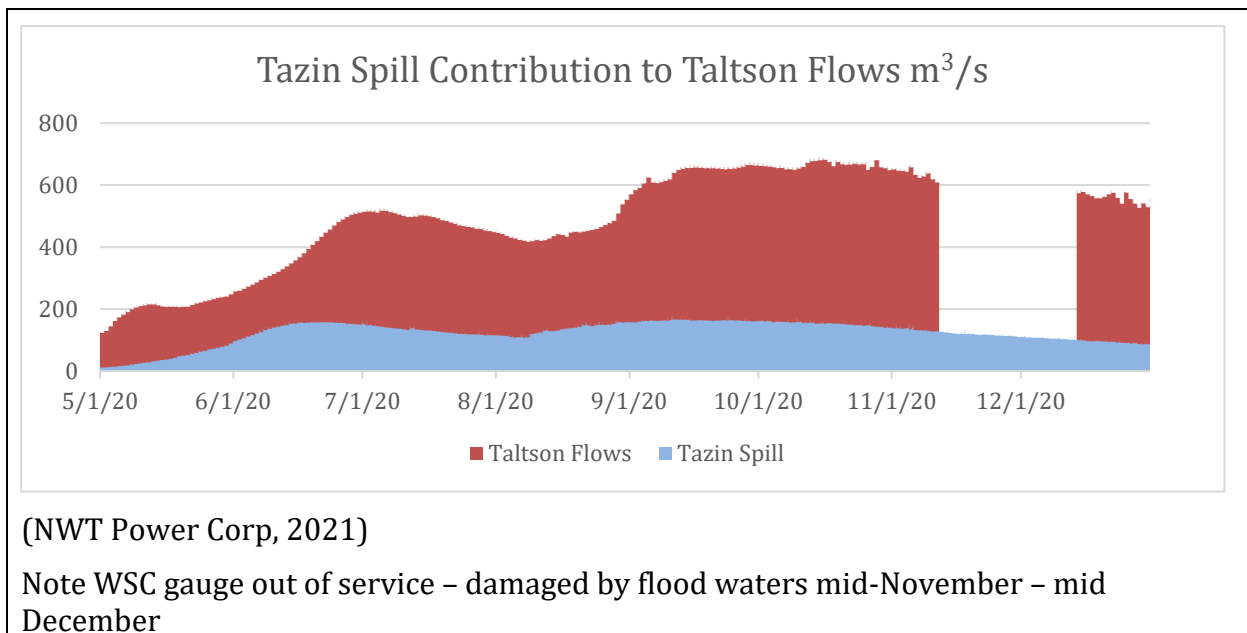


Tazin Lake Overflow Weir (From Google search) (NWT Power Corp, 2021)

Tazin river was developed to provide power for mines in northern Saskatchewan and those hydro plants were eventually taken over by Sask Power. Water from Tazin lake is used for

Hydro power generation and flows into Lake Athabasca. Overflow from Tazin lake flows northward in the Taltson river basin.

Since the construction of the Tazin weir by SaskPower in 1958, overflow from Tazin Lake has been seasonal, with no outflow at all in 14 of the 39 years with hydrometric data available. 2020 is the only year on record since 1958 where the lake elevation has exceeded the weir height throughout the entire year. (NWT Power Corp, 2021). As seen, in the water flow chart, in October 2020 Tazin contributed approximately an additional 20% to the Taltson river flows.



Flow Summary

- All flows over the Nonacho spillway arrive in the Twin Gorges forebay,
- Overflow from Tazin Lake flows into the Taltson River upstream of the Taltson hydro plant and thus form past of the twin gorges forebay,
- Water from Twin Gorges flows either through the hydro plant or over the South Valley spillway,
- Water from the hydro plant and South Valley spillway recombine 1.8 km downstream of the hydro plant

2020 has been a high water year – the highest in several decades. The Tazin inflows, while contributing to the Taltson inflows, are not the singular cause of the high Taltson levels. Tazin being at an all time high is consistent with other water sheds, including Taltson, also being at all time highs.

2020 High Water Year – Environment and Natural Resources Response

GNWT - ENR recognized that fall of 2020 was going to have regional high-water events, which they attributed to higher than average precipitation in northern Saskatchewan and southern NWT.

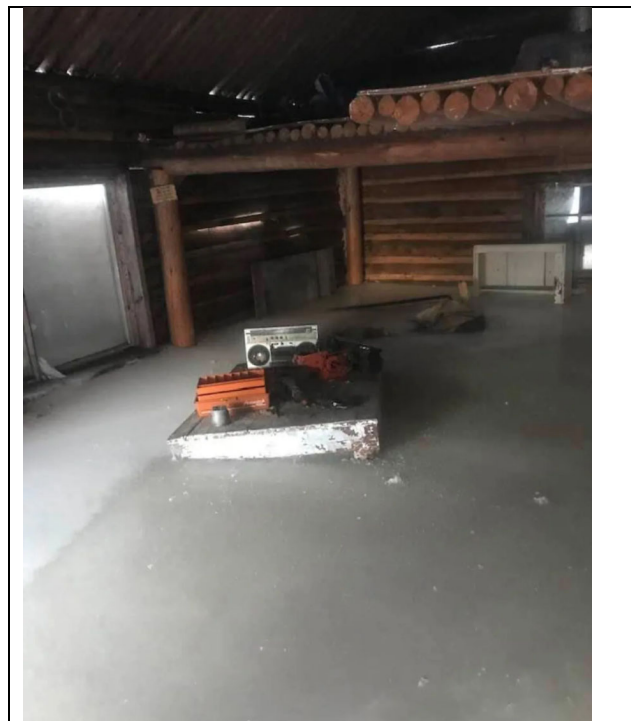
ENR took several steps including;

- Analyzing the Taltson river flow and found that in November, 2020 the flow was almost three times higher than average (628 vs 215 m³/s),
- Conducting an aerial flyover of the Taltson river system,
- Meeting with local trappers to determine the extent of flooding,
- Visiting impacted sites to determine extent of impact
- Releasing a public service announcement (PSA), in November 2020, to advise the public on the high-water levels

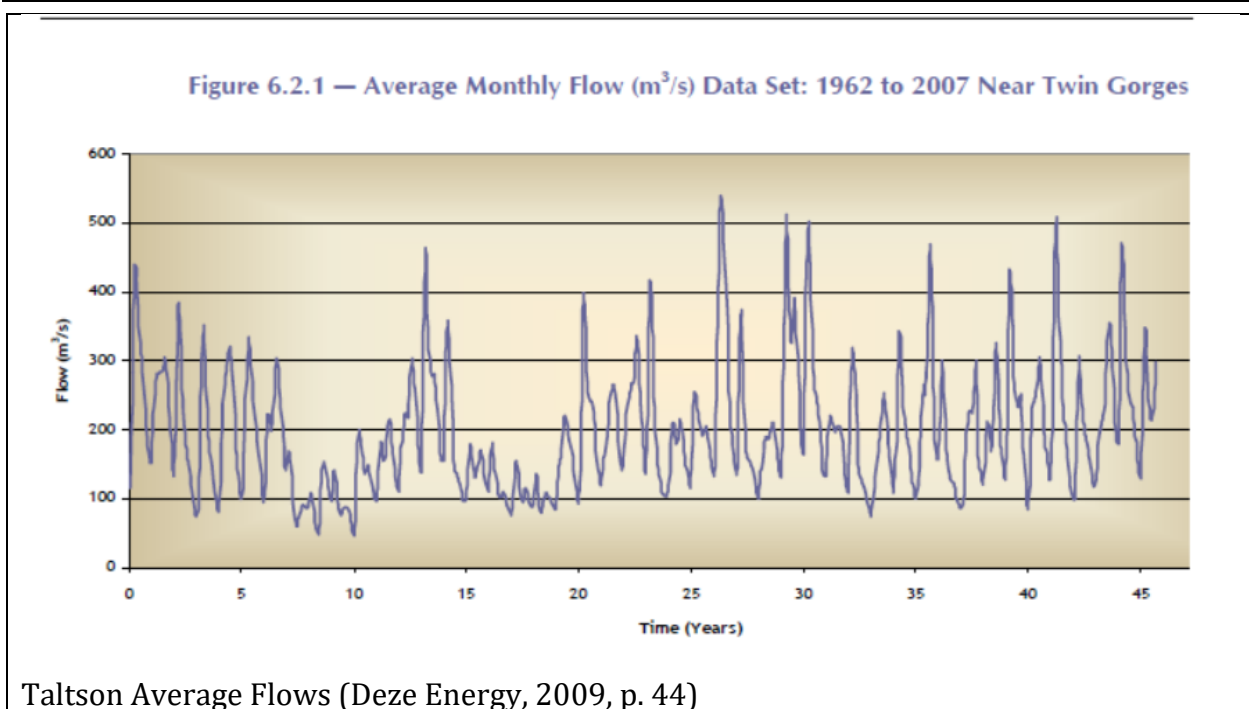
2020 High Water Year – Trapper Concerns

There are reports in the media and by trappers on social media that water levels are very high; so high that their cabins and trapping areas have been flooded. This is highly credible. With the record high inflows, inundation of areas adjacent to the waterway is bound to occur. Arthur Beck provided a photo of his cabin to CBC News showing frozen water nearly up to the height of a table inside the cabin.

From 1962 to 2007, Taltson flows peaked at just over 500 m³/s. In 2020 the peak flow was almost 700 m³/s. Note these figures are not directly comparable as one is a monthly average, while the other is measured more frequently. However, the data illustrates the point that the flows were much higher in 2020 than previously recorded.



A. Beck's Cabin Fall 2020 (CBC News, 2021)



It has been suggested that NTPC had “releases” of water in fall 2020 that exacerbated the flooding problems downstream of the Taltson plant / South Valley spillway. This is not correct;

- 1) In 2020 NTPC did not release any batches of water.
- 2) The South Valley Spillway has been free flowing over the weir and is in natural flow condition.
- 3) The Nonacho control structure has gates that can be opened to let more water through. These gates have been closed since 2014 and remained closed throughout 2020. The maximum flow through the Nonacho gates is 51.49 m³/s at full reservoir. The Nonacho spillway has been free flowing over the weir and is in natural flow condition.
- 4) The Taltson Hydro plant operated normally during fall 2020. The Taltson Hydro plant can control only up to 67 m³/s of water – and at current loading is about half that amount – approx. 5% of the Taltson river flows
- 5) If the operation of the hydro plant changes, the diverted water flow makes a corresponding change at the spillway. After the confluence of Trudel Creek and Taltson River the two changes net out to zero.
- 6) Even if the Nonacho gates had been opened in 2020, the result would simply be trading off water above the gates for water below the gates. The problem in 2020 is that there is simply too much water everywhere.

Summary

In summary, the Trappers are correct – There has been very high water in 2020 and it has impacted their cabins and trapping areas.

It is natural to question whether the Taltson Hydro plant, as the only hydroelectric facility on the river, had something to do with the high water.

The answer is no. Even if the Taltson plant and associated spillways had never been built, 2020 would have still been a record high water year.

References

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