

Site C Project

Downstream effects on the Peace River

NOVEMBER 2023

During Site C reservoir filling and once the dam comes into service by 2025, the project will have only small effects on Peace River flows downstream of the dam.

Overall, those effects will be concentrated on the area immediately downstream of the dam within B.C. As the river flows into Alberta, water from tributaries joining the Peace River will lessen any changes caused by Site C.

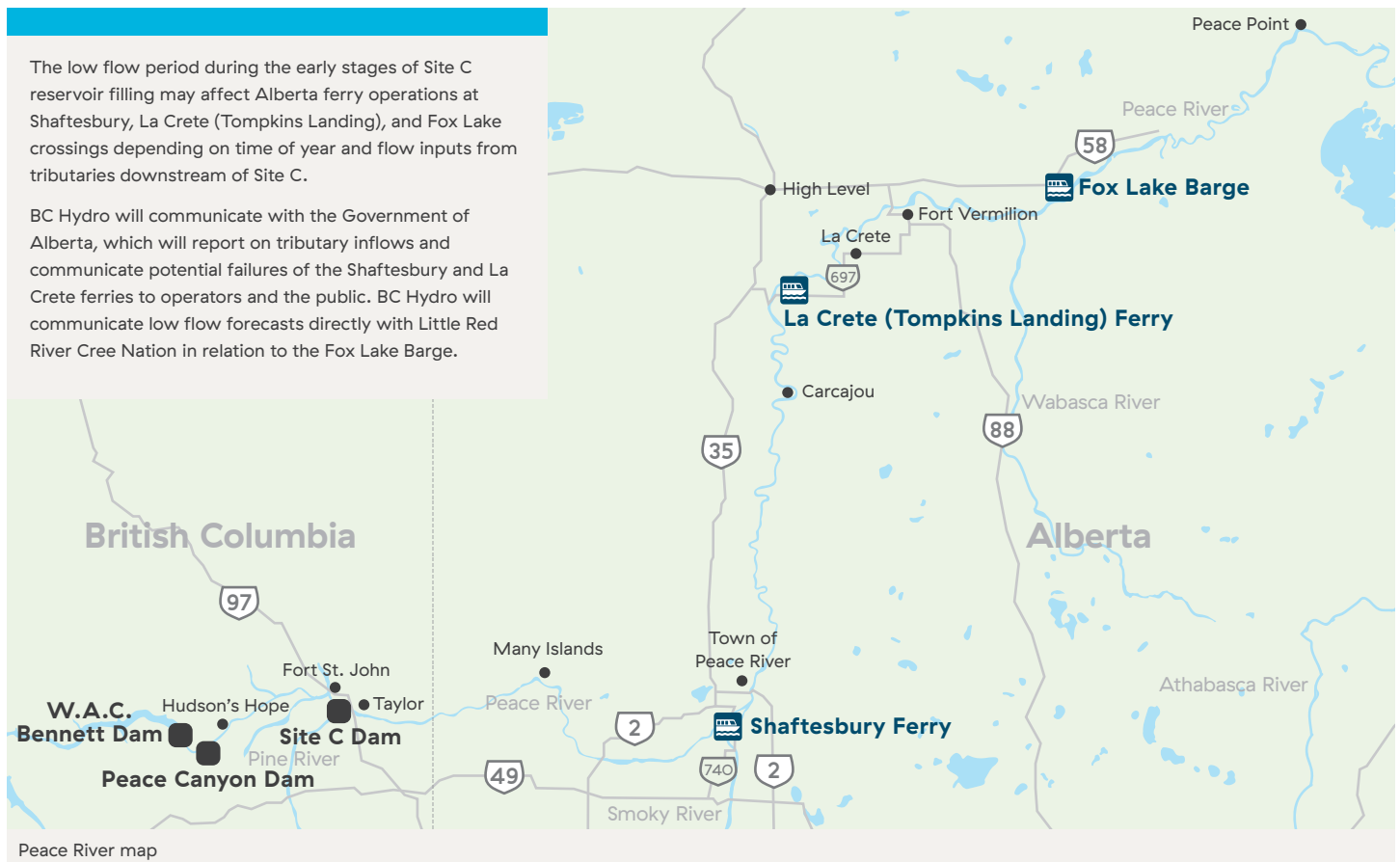
Water flows and levels

BC Hydro continually discharges water from the W.A.C. Bennett and Peace Canyon dams into the Peace River. With the construction of Site C, the point at which the Peace River is regulated moves 85 kilometres eastwards downstream—from the Peace Canyon Dam near Hudson’s Hope, to the Site C dam near Fort St. John.

During the early stages of reservoir filling which will take place in late summer / early fall 2024, Peace River flows directly downstream of Site C are expected to be low, near the project’s minimum licensed flow of 390 m³/s for approximately one month.

The low flow period during the early stages of Site C reservoir filling may affect Alberta ferry operations at Shaftesbury, La Crete (Tompkins Landing), and Fox Lake crossings depending on time of year and flow inputs from tributaries downstream of Site C.

BC Hydro will communicate with the Government of Alberta, which will report on tributary inflows and communicate potential failures of the Shaftesbury and La Crete ferries to operators and the public. BC Hydro will communicate low flow forecasts directly with Little Red River Cree Nation in relation to the Fox Lake Barge.

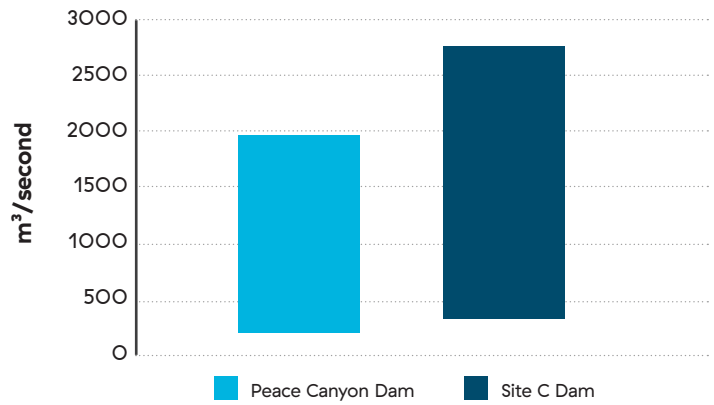


Water flows and levels

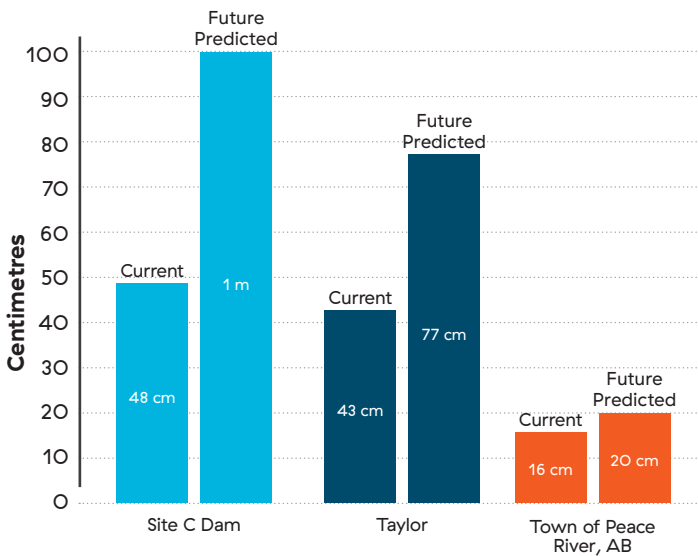
After Site C is complete, it will become part of BC Hydro's integrated system to meet provincial electricity demands. Electrical demand in B.C. is highest during the winter months, weekdays, and morning or evening hours. During these times, discharges from most of BC Hydro's generating stations, including Site C, will be higher. Reservoir operations and the resulting river flows will meet all regulatory requirements, including fisheries, industrial and recreation needs, and others.

The Peace Canyon Generating Station, 85 kilometres upstream of Site C, normally discharges water from its turbines within the normal operating range of 283 to 1,982 m³/second. The Site C generating station, with additional inflow from local tributaries, will normally discharge water from its turbines at a rate ranging from 390 to 2,700 m³/s. Occasionally, Site C will need to discharge additional water from its spillways.

DAILY WATER DISCHARGE RANGE



DAILY AVERAGE WATER LEVEL RANGE



The amount and rate of daily water level changes decrease with distance from the dam site. The graph on the left compares the current and future daily water level ranges.

Downstream water levels will vary, depending on discharges from Site C, flow in downstream tributaries, and topographic features at different locations on the Peace River.

Water temperatures

Water temperatures in the Peace River immediately downstream of Site C are expected to be slightly warmer in the winter, and slightly cooler in the summer.

Temperatures will be warmer than existing conditions between July and January, with differences ranging between 0.3°C (July) and 1.5°C (January).

During the remainder of the year (February through June), water temperatures in the Peace River just downstream of the Site C dam are expected to be cooler than existing conditions, ranging between 0.4°C (March) and 0.9°C (June). In all months, the daily water temperature range with the project is expected to be lower than the existing temperature range.

Ice regime

During the early winter months, the ice on the Peace River begins to accumulate on the far downstream reaches of the river (northeastern Alberta), and then moves upstream, reaching as far as B.C. in some years.

With Site C in place, the Peace River ice cover will be less likely to reach B.C., due to the warmer water flowing from the Site C reservoir. Ice cover formation will be unaffected in Alberta downstream of Carcajou and is still expected to continue to reach the town of Peace River, Alberta in most winters. There is no likelihood of the ice cover reaching the dam site near Fort St. John.

Site C may delay freeze-up at the Town of Peace River by a few days, but no change in breakup timing is anticipated. Ice-related water levels are anticipated to be largely the same as they are now.

Farther upstream of the Town of Peace River, the extent of the ice cover will be about 50 kilometres less and will not reach Taylor, B.C.

Since reservoir filling is expected to take place before the start of the ice bridge season, BC Hydro does not expect any notable changes to downstream ice bridges. BC Hydro will communicate with the Alberta government regarding specific timing of reservoir filling.

Water clarity

Downstream Peace River suspended sediments are expected to lessen but would result in negligible changes to the overall river. This is due to the large sediment contributions from downstream tributaries, such as the Pine, Beatton and Smoky rivers.

Peace River suspended sediment levels will increase during Site C construction as excavation disturbs the river bottom. This will occur from summer 2020 until the project is completed in 2024.

There will also be increased suspended sediment levels during the initial period of reservoir filling, lasting several months as water picks up the sediment from previously dry land. Peace River suspended sediment levels will be regularly monitored throughout this time.

Fish habitat

Fish habitat changes in the Peace River downstream of Site C will affect the fish community. Overall, we predict an increase in fish population, mainly due to an increase in abundance of mountain whitefish due to better water clarity.

Water temperatures are expected to remain within the annual range of existing fish habitat conditions. More over-winter habitat for fish may occur due to warmer water (within existing range) in the winter and downstream movement of the ice front. We expect this to support increased fish populations due to higher over-winter fish survival rates.

We expect the mountain whitefish, Arctic grayling, rainbow trout and bull trout populations to remain and potentially extend their distribution further downstream in Alberta after the construction of the dam.

Greater fluctuations in water flow in the 16-kilometre-long section of river between the dam site and the Pine River will result in a greater risk of fish stranding.

BC Hydro is addressing this risk by enhancing fish habitat in the area, which will provide permanently wetted protected channels for fish spawning and rearing.



Bull trout



Construction of new downstream channels for fish habitat

Fish methylmercury levels will increase

Mercury is found everywhere in the environment—in air, water, soil, plants, animals and fish.

The process of converting inorganic mercury to methylmercury temporarily speeds up when a new reservoir is created, due to the rapid decomposition of soil and vegetation previously on dry land.

Current methylmercury levels of Peace River fish are lower than those of similar fish in other lakes and reservoirs in B.C., and among the lowest in Canada.

Those levels will temporarily change when we begin filling the Site C reservoir in 2024. Fish methylmercury levels are predicted to increase by an average of three to four times the baseline level in the newly created reservoir, and slowly return to a new baseline after approximately 20–30 years.

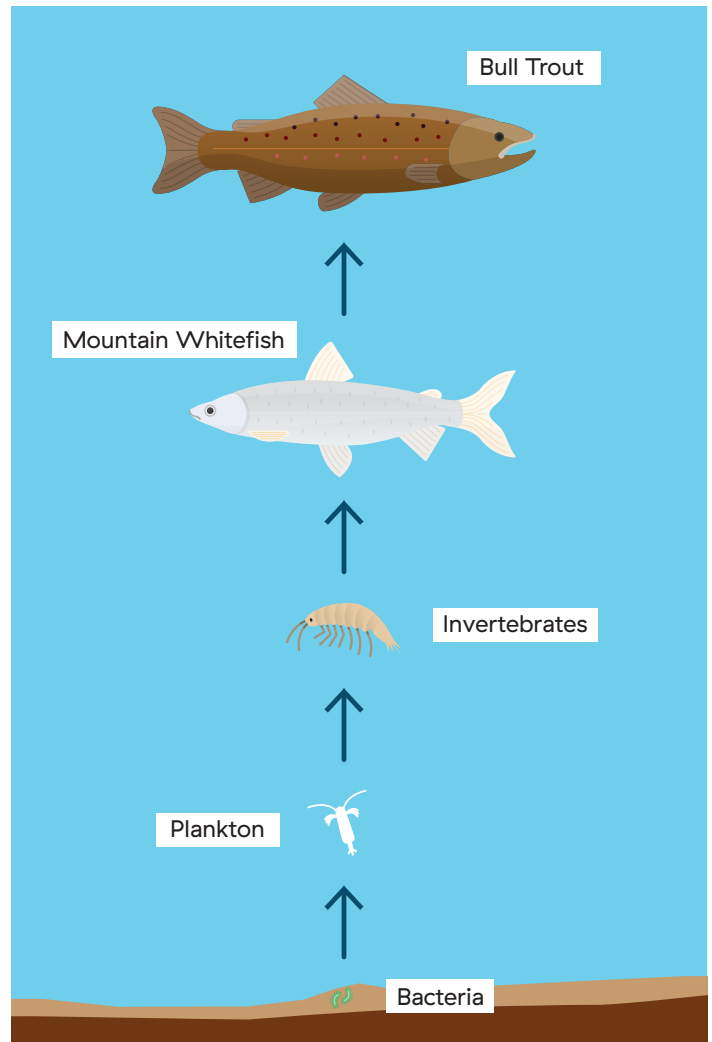
Fish, water, sediment, and aquatic bugs containing methylmercury from the Site C reservoir will be flushed downstream. This is predicted to cause downstream fish methylmercury levels to double, possibly as far away as Many Islands, Alberta, before returning to a new baseline.

The current understanding of peak mercury levels in fish after filling the Site C reservoir is based on scientific predictions. In collaboration with Indigenous Nations, communities and health authorities, BC Hydro developed a methylmercury monitoring plan for Site C to verify predicted levels of mercury in fish.

The plan includes regularly measuring methylmercury levels in local fish and collecting information on how much fish people are eating. This information will be communicated, in partnership with B.C. and Alberta health authorities, to Indigenous Nations and the general public.

Downstream monitoring plan

BC Hydro has a plan to monitor the downstream impacts of Site C for 20 years after the reservoir is filled. The plan, developed with input from Indigenous Nations, will examine water flows and levels, as well as ice on the Peace River in Alberta including areas in the Wood Buffalo National Park.



[Learn more about methylmercury in fish.](#)

Fisheries and aquatic habitat monitoring will continue to take place downstream to Many Islands, Alberta for another 30 years after the reservoir is filled.

BC Hydro will file annual monitoring reports.

[Learn more about fish habitat enhancements and monitoring programs.](#)