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Fishing for changes caused by dam

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FREDERICTON * Dangling a long rope attached to an open plastic bottle, Ben Wallace keeps steady watch from Fredericton's old train bridge as he scoops water from the St. John River.

The technician from the Canadian Rivers Institute at the University of New Brunswick doesn't want any freak accidents.

"Later in the summer, you have to watch it, especially with the power boats coming through," he says, motioning at the surface that's the equivalent of a three-storey plunge. "You don't want the bottle to suddenly drop and hit a speeding boater in the head."

Every three weeks, or whenever there's heavy rain or flooding that changes the flow of the river, Wallace and two summer students, Sarah McGeachy and Joseph Cormier, draw samples from the three observation decks on the downtown bridge and take them to government laboratories in nearby Marysville.

It's just one small part of a massive study undertaken by the institute in partnership with NB Power, which is trying to decide what to do with one of its biggest electrical generators, the Mactaquac Dam, about 15 kilometres upriver from the capital.

The concrete powerhouse and spillway are under stress because they were made with

local rock that's slowly expanding. The alkali-silica reaction in concrete has been documented since the 1940s but was overlooked when the dam was built in the late 1960s. The Crown utility says it has to mothball the plant by 2030, when the station is less than two-thirds of the way through its 100-year design life.

The options are to remove the earthen dam and all the associated structures and return the river to its natural state, shut everything down but leave only some of the structures in place, or build a new powerhouse and spillway on the other side of the dam.

Whatever option is chosen, ratepayers will be on the hook for billions of dollars in extra costs.

Before it makes the decision, likely next year, NB Power wants a scientific assessment on how each option would affect the river's health. Already, it has dedicated \$2.3 million to a multi-faceted study by the rivers institute, with private conservation groups also contributing. More money is expected in the near future from Ottawa.

Starting Monday, three scientific crews from UNB will be on the headpond above the dam. When Mactaquac was built, it created what is, in effect, a deep lake system that's behind it, creating a landscape that's now home to expensive residential properties, a provincial park and a boat

club and marina.

It has also led to the deposit of sediment from upriver for more than 47 years.

The two- to four-person crews are resuming work they began last year - mapping the bottom of the riverbed using acoustic instrumentation devices above water, along with the valleys and peaks of sediment, and taking core samples of the muck underneath to see what's inside.

The samples will be taken using NB Power's wood hog - essentially a barge with a crane arm that's normally used by the utility to clear out deadwood that flows down during the spring freshet and risks causing problems for the spillway gates and turbines that generate power.

"You need to know what would happen to all that sediment if they decide to take the dam out," said Allen Curry, director of the Rivers Institute. "There's sand and silt, fine particulate material, that's flowed downriver following years of erosion from the river's tributaries. If the reservoir comes down, all the sediment that's accumulated since the dam was built will be let go."

Rivers like the St. John usually push sediment downstream until it's deposited in the ocean. The waters behind the dam, however, don't flow as fast and are more like a lake environment. The movement of the silt slows down and eventually drops to the bottom. The biggest accumulation, Curry says, is as far back as Nackawic, some 40 kilometres upriver from the dam.

"Whatever's in that sediment - and let's say the dam is taken out and the sediment moves, and it carries downstream, it will have an effect on aquatic life. Pesticides,

metals, anything we've put into the river - and if it's accumulated in the sediment, we need to know where that material could potentially go."

This spring and summer, the scientists will be working on a number of individual projects, including measuring the water quality in the river and reservoir, tagging and tracking fish to map their habitats, conducting acoustic surveys to map the bottom of the head pond, assessing the decomposition rates in the river and assessing the health of the river's and reservoir's ecosystem.

Over the years, the lake effect of the headpond has likely reduced the number of fish species above the big dam. Curry said the river near Fredericton has the greatest diversity of fish in the entire system - as many as 55 species have been identified. Above the dam, there's only about half that amount.

Much of this study involves electrofishing. The scientists use special instrumentation to zap the water and temporarily stun fish. They are collected when they float to the surface, measured, tagged, and then put back in the water, largely unharmed.

In the meantime, NB Power has already warned people in the Mactaquac area that preliminary testing for a potential new station on the south bank of the river will take place between June and July, something that will likely create some extra noise and traffic as engineers drill big test holes.

The project is pivotal to New Brunswick's future - the Mactaquac station has the capacity to generate 660 megawatts of energy using the flow of water through six

turbines. It supplies about 12 per cent of New Brunswick homes and businesses with low-cost power, and it's the only station in the Maritimes that can restart the entire grid after a widespread blackout.

Given the transformative effect Mactaquac had on the landscape, any change there will also have implications for people who live and work along the river.

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