

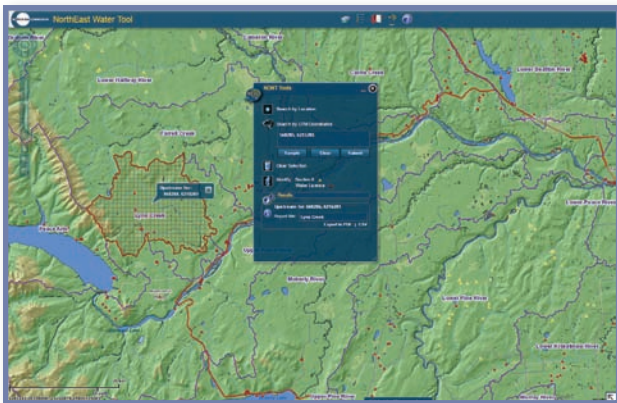
DATA DRIVEN

BC's Innovative Web-based Tools for Water Management



Peace River Valley near the Halfway River. PHOTO: ©USER:TUCHODI/WIKIMEDIA COMMONS/CC-BY-SA-2.0.

Tom Ruffen



The NorthEast Water Tool (NEWT) allows the user to view any river or lake in the region and click on a point to extract information on the flow of the river.



Allan Chapman, P.Geo., shown here with the NorthEast Water Tool, which was recognized with a BC Premier's Regional Award for Innovation in 2013.

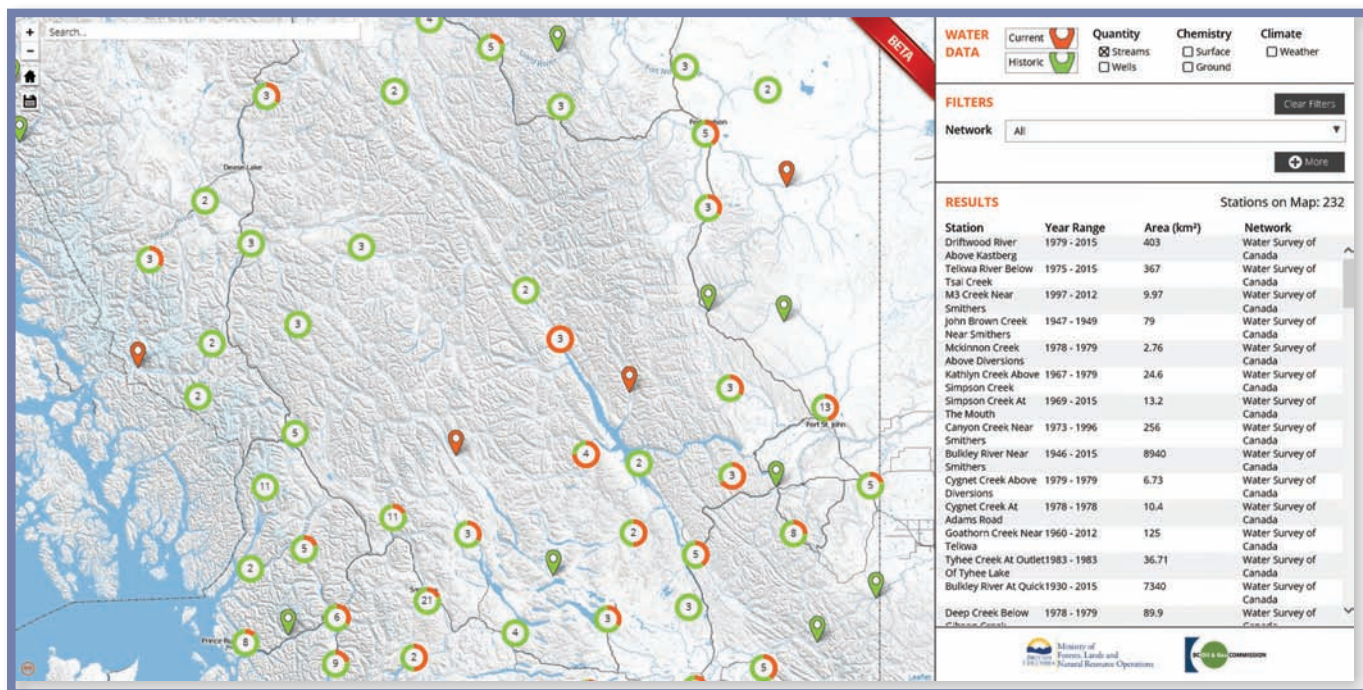
Historically the demand for water has been quite low in sparsely populated northern British Columbia, but in recent years the search for new energy sources has created the need to improve the province's water management capabilities.

"Access to water is very important for unconventional natural gas development," says hydrologist Allan Chapman, P.Geo., the Regional Water Manager for the BC Oil and Gas Commission, and the technical lead on the development of NEWT, the NorthEast Water Tool, a first-of-its-kind water information system. "The Commission has a mandate to regulate oil and gas activities in British Columbia in a manner that provides for the sound development of the oil and gas sector by fostering a healthy environment, a sound economy and social well-being."

Identifying a Need and a Solution

Over the past three years, the Commission, along with the BC Ministry of Forests, Lands, and Natural Resource Operations, has led the way in the development of NEWT and other leading-edge web-based information tools that are easily accessible to government agencies, industry, First Nations communities and the public at large. In addition to NEWT, the newly created NorthWest Water Tool (NWWT) and the Water Data Portal are freely available on the BC Oil and Gas Commission website.

"We started with the NorthEast Water Tool, which is derived from an innovative hydrology modelling approach that encompassed the entire northeast section of BC," says Chapman. "I was at an oil and gas-related conference in Calgary in early 2011 and was sitting in the back of the room with Ben Kerr of Foundry Spatial Limited. We were



The NorthWest Water Tool provides data on watersheds that included the Skeena and Stikine rivers as well as the headwaters of the Yukon River.

lamenting the lack of hydrology monitoring in northeast BC to support the booming natural gas development.”

Kerr, the founder and lead analyst of Foundry Spatial is a geographic information system (GIS) data expert. During the Calgary conference, he and Chapman decided to sketch out a framework for a new approach to modelling using spatially explicit driving data, such as ClimateBC, the Freshwater Atlas watersheds, Forest Inventory Program data and other sources. On the basis of that framework, Chapman and the BC Oil and Gas Commission contracted Victoria-based Foundry Spatial to test the modelling for the Horn River Basin gas play area. The results were so successful that the Commission then partnered with the BC Ministry of Forests, Lands and Natural Resource Operations, enabling Chapman, Kerr and their staff teams to create a model for the entire northeast corner of the province.

“A model is an attempt to run some element of the natural world, like a river, into a mathematical expression that you can then use to describe the river,” says Chapman. “I was interested in the concept of modelling for the whole landscape. Typically, a hydrological model is done for an individual river, but the need across the northeast was broader, so we did a model of the Peace and the Liard rivers and all the tributaries and lakes.”

Making Data Accessible

The modeling approach for NEWT brought together hydrology, climatology, forestry, energy and carbon-related research, says Ben Kerr. “The goal was to provide impartial information on water resources. By improving awareness and understanding, the tool ensures that transparent decisions can be made. It allows water management professionals to focus their time and efforts on improving stewardship of the resource. Previously, authorizations staff were not able to relate water licence submissions to available natural supply and existing licenced use in a watershed without

performing a one-off exercise each time. Now this kind of information is easily and publically accessible, which really raises the base level of understanding across the wide range of stakeholders with an interest in sustainable water management.”

A recipient of a Premier’s Regional Award for Innovation, NEWT is the first of its kind anywhere in the world. The tool allows the user to view any river or lake in the region and click on a point to extract information on the flow of the river—on how much water is being protected for fish and the environment, how much water has already been licenced for use, and how much water might be remaining for possible allocation. It also provides a listing of all the water licences and leases that have already been issued. The tool is used by industry to help understand water availability from different sources they may be considering. It is also used by First Nations and the general public to understand water supply and demand, and cumulative effects in specific locations.

“Before we had this tool, an analytical hydrologist could determine the potential flow of water at any point in a river system, but analytical hydrologists are far and few between” says Dr. David Wilford, P.Geo., RPF, Natural Resource Sciences Team Leader and Research Hydrologist for the BC Ministry of Forests, Lands, and Natural Resource Operations. “NEWT provides average citizens and civil servants with the information they need to make decisions or review technical work provided by proponents.”

Based in Smithers, Wilford was instrumental in helping to create BC’s new water allocation tools. “I have been a technical administrator to bring the projects to life,” he says. “I saw a need, knew what operational people needed, and made things happen at the program and financial levels.”

After NEWT, Allan Chapman and Ben Kerr developed another GIS-tool, the Water Data Portal, which provides map-based public access to an array of water-related information that has generally

been difficult for people to access, including stream flow data, surface water and ground water monitoring data, and climate data collected by a number of organizations. The portal provides information in easy-to-interpret graphical and tabular formats.

Tools for Forward-looking Decision Making

Based on the success of these tools, David Wilford initiated the development of NWWT, the NorthWest Water Tool, bringing in hydrologist Scott Jackson of Lorax Environmental Services to work with Ben Kerr on watersheds that included the Skeena and Stikine rivers as well as the headwaters of the Yukon River. The NWWT applies a climate change lens to future hydrologic conditions.

“Development pressures have increased in northwest BC with regard to metal mining and run-of-river projects,” says Vancouver-based Scott Jackson. “NWWT definitely makes it easier to quickly show a client the potential restrictions and expected changes to streamflow in a given watershed. This opens up the discussion on how to best design a project to be more robust to greater variation in the water balance that will result from a changing climate. The climate change lens in the NWWT will enable water resource managers and the public to make decisions that are informed by the projected changes to precipitation and temperature, the key drivers of streamflow.”

NWWT has been helpful in identifying the implications of climate change on long-term installations such as mine tailings ponds, notes David Wilford. “These ponds will be there for hundreds of years. Designing them for future climates is critical, not only for the site but for the downstream watersheds.”

These user-friendly water tools have attracted the attention of other jurisdictions in Canada and around the world. “We’ve developed a tool in Alberta involving the Athabasca, Peace, and North Saskatchewan rivers,” says Kerr. “We’re also involved in building a tool for the Omenica region of BC and project development activities are underway to expand the geographic coverage of the water tools to meet the demands of water managers in other regions of the province. We have also presented in Australia and the United States.”

In 2014, Allan Chapman was honoured by APEGBC as the recipient of the C.J. Westerman Memorial Award, primarily for his groundbreaking work on the NorthEast Water Tool, but Chapman is quick to point out that creating such tools is a collaborative undertaking that relies on the efforts of many people at the technical and managerial levels. “Ben Kerr, David Wilford and Scott Jackson and I all share a passion for taking complex hydraulics and hydrology data and translating that into language and formats that almost anyone could understand and learn from.” ☒

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