Northwest Water Tool
Ministry of Forests, Lands, Natural Resource Operations and Rural Development

The Ministry of Forests, Lands, Natural Resource Operations and Rural Development (FLNRORD) worked with Foundry Spatial Ltd. and the BC Oil and Gas Commission to develop the Northwest Water Tool to support decisions on water use approvals and planning in northwest British Columbia. It is one piece of information that a statutory decision-maker may use in making a water allocation determination. It is a public-facing application and is available to all British Columbians. The Northwest Water Tool provides estimates of streamflow for rivers and lakes across the northwest corner of BC. The tool leverages the BC Freshwater Atlas (Gray 2009) to communicate the results of detailed hydrology modeling conducted using a similar methodology to that used in the development of the Northeast Water Tool (NEWT) for Northeast BC (Chapman et al. 2018). Users are able to generate reports describing the hydrology of over 1.1 million watersheds in the region. These reports also include information on existing water users in the watershed and other watershed characteristics such as land cover, climate, and predicted future climate change.

Recent updates in 2020 include the incorporation of estimates of hydrologic variability for all watersheds in the region, full mobile compatibility and the ability to interact with the report content within the application. The Environmental flow needs of the watershed are addressed by implementing the Province of BC's Environmental Flow Needs Policy (Government of British Columbia 2016) to determine risk levels for cumulative allocations in a given watershed.

To access the Northwest Water Tool visit http://nwwt.bcwatertool.ca

Considerations when using the Northwest Water Tool:

1. Estimates v.s. current conditions:
The hydrology estimates in the Northwest Water Tool represent long-term characteristics. Inter-annual variations in hydrology are often significant. Actual water availability may differ substantially in any given year. In years of lower than average availability, in particular, this may impact existing and proposed water uses.

2. Estimates based on hydrologic modeling:
The underlying hydrology information used in the Northwest Water Tool was developed using models, which have associated uncertainties. The model for mean monthly and annual flows used 123 hydrometric stations in BC, the Yukon and Alaska for calibration and validation. Modeled runoff was within 20% of the measured runoff for 80.5% of these stations. Median error was -4.2%, and mean absolute error was 13.9%. This level of uncertainty is considered reasonable in hydrology modeling literature. In the deployment of the Northwest Water Tool, subsequent steps were taken to match annual runoff estimates in watersheds associated with hydrometric stations, with long term mean annual runoff from the hydrometric stations used in the model.

3. Estimates of hydrologic variability:

Variability estimates have been produced using a flow duration curve replacement approach, which identifies similar gauged watersheds to the ungauged watershed of interest and applies the observed variability in these gauged watersheds to the ungauged watershed to provide an estimate of the potential range of variability. Research results describing this method are being summarized in a publication that will be referenced here when available. For more information in the interim, please contact bcwatertool@foundryspatial.com.

4. Model domain:

Model performance has been calculated based on the gauged watersheds used for calibration and validation in the modeling exercise. These gauged watersheds have a range of characteristics when considering factors such as elevation, size, climate, glacier cover, and land use, among others. Substantial areas exist within the study area that are outside of the range of characteristics of the gauged watersheds. Model performance within these areas is unknown. Estimates of hydrologic variability are derived from the same network of gauged watersheds, and variability estimates for watersheds outside of the domain of these gauged watersheds may be less reliable.

5. Water allocation data:

The Northwest Water Tool includes information on short term use approvals and long-term licenses issued under the Water Sustainability Act. This information is drawn from digital databases that do not fully represent all conditions specified in a license or approval. In applying the rules used within the Northwest Water Tool to summarize existing water allocations, conservative assumptions have been made which typically overestimate the actual amount of water licensed on a monthly and annual basis.

The original, legal documents associated with an approval should be considered the authoritative source in all cases of disagreement with results presented within the tool. Direct links to digital copies of water licenses are provided within the tool, and may also be accessed from https://j200.gov.bc.ca/pub/ams/Default.aspx

6. Watershed boundaries:

The BC Freshwater Atlas (FWA) is used to generate watersheds associated with each stream, river and lake in the region. Underlying errors in the FWA may lead to incorrect representations of hydrologic connectivity, and in turn, to errors in the watershed-based estimates of hydrology and other characteristics. As such, no guarantee of accuracy may be provided.

References:

Chapman, A. R., B. Kerr, D. Wilford. (2018). A Water Allocation Decision-Support Model and Tool for Predictions in Ungauged Basins in Northeast British Columbia, Canada. JAWRA Journal of the American Water Resources Association, 54(3), 676-693.

Government of British Columbia (2020). Water Policies - Environmental Flow Needs. Retrieved from https://www2.gov.bc.ca/gov/content/environment/air-land-water/water/water-licensing-rights/water-policies

Gray, M. 2009. The BC Freshwater Atlas. Streamline Watershed Management Bulletin, Vol.12/No.2, 24- 26.