Modelling Stream Sensitivity to Pumping in the Bertrand Creek Watershed

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Presentation Description:

The fundamentals of groundwater – stream interactions will be introduced, with an emphasis on spatial variation and the implications of groundwater pumping. A groundwater modelling study conducted in the lower mainland will highlight these concepts.

Abstract:

The groundwater contribution to many streams sustains streamflow during periods of reduced precipitation, and therefore is critical for maintaining healthy aquatic ecosystems, particularly during the summer low flow season. However, changes in the aquifer, such as pumping, can reduce or eliminate this groundwater contribution, leading to streamflow depletion and can vary spatially, temporally and under different stress conditions. Substantial streamflow decline observed along in Bertrand Creek during recent summers prompted this study of groundwater – surface water exchanges within the Bertrand Creek Watershed. A steady-state 3D numerical groundwater flow model was developed to quantify the exchanges between the stream and groundwater system along segments of Bertrand Creek, under natural conditions and pumping conditions, in order to identify stream segments that may be more sensitive to pumping. Under simulated natural conditions, Bertrand Creek is a dominantly losing stream, where stream water seeps into the aquifer. Under simulated pumping conditions, Bertrand Creek experiences an increase in seepage from the stream into the groundwater system. More stream water is redirected into the aquifers to accommodate pumping, resulting in less groundwater being able to recharge the stream. Groundwater abstraction, particularly during the summer, is likely to exacerbate the losing nature of the stream increasing the potential impacts to aquatic ecosystems.